# RESEARCH REPORT

# SOUTHEAST FALSE CREEK DESIGN CHARRETTE

## EXPLORING HIGH DENSITY, SUSTAINABLE URBAN DEVELOPMENT

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# SOUTHEAST FALSE CREEK DESIGN CHARRETTE

# EXPLORING HIGH DENSITY, SUSTAINABLE URBAN DEVELOPMENT

Final Report

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# PREFACE

It is important to engage in design explorations of proposed policies as they are being created, to fine-tune them and ensure they are realistic. Frequently, these explorations are undertaken informally and, often, few have access to their results. Design explorations of proposed policies also uncover new ideas for a development, and the drawings which emerge from these explorations provide visuals which all stakeholders can easily understand.

A charrette allows these design explorations to take place in a unique, relatively public forum. The creation of several options, along with the explicitly stated purpose of exploration and experimentation, ensures that stakeholders do not mistake any design schemes as a final plan.

Because of their multidisciplinary nature, charrettes are especially useful in developing and fine-tuning sustainable development policies, many of which propose alternative development patterns and technologies. Through discussions on a multidisciplinary charrette team, creative solutions can be found which meet environmental, social and economic objectives. The drawings from the charrette can then be used to explain the ideas to other stakeholders—a process which encourages more ideas. Ultimately, decision makers are able to make a more informed selection from the various options.

The Southeast False Creek charrette provided an unprecedented opportunity for Canada Mortgage and Housing Corporation and the City of Vancouver to study the application of sustainable development principles to high-density development. Southeast False Creek and the design charrette offer many lessons to other Canadian cities, not only in urban development for the 21st century, but also in how useful a charrette can be in exploring the implications of sustainability on modern cities.

# AN EPILOGUE AND A PROLOGUE

A charrette process is stimulating and exciting. It opens up an array of possibilities and provides an environment for them to be discussed, without the filter of what is and what is not procedurally possible.

Even more stimulating and exciting is the process of implementation, of actually getting good stuff built and lived in. As of the spring of 2000 the South East Project has progressed to the point where a set of Planning Policies have been approved, and Vancouver City Council has given the go-ahead to proceed with the Official Development Plan and the Area Rezoning.

During the time frame of the Policy Process the City's Real Estate Services Department had commissioned Stanley Kwok as Development Consultant and Baker McGarva Hart as Architects and Planners. A significant part of this work was the investigation of holistic options to structure a development plan that encompassed the social environmental and economic sustainability issues that were being developed in the City Planning Department's policy process. These factors had also to be integrated with the overlay of development issues and public amenities that have evolved from the City's previous decade of work on the inner city neighbourhoods of False Creek North, Coal Harbour etc.

While these parallel processes had different emphases, (policy planning to establish development parameters, and development planning to assess policy implications), the outcome was that they came together in a Policy Document that was jointly supported by the various departments of City Hall and by a broad cross section of the community and advocacy groups.

The charrette must be seen in the light of the above process. In October of 1998 the participants were provided with an outline of parameters to work within. These included site boundaries and development densities, existing city development standards as well as potential 'sustainability' targets. For the sake of clarity the site included several acres of land not owned nor under the control of the City, and the exercise did not constrain design teams with compliance to Provincial and Federal soil remediation nor shoreline regulations that would play a major role in the SEFC's eventual development plan approval.

The focus of the exercise was an independent overview that would compare with the in-house work being done by City staff and its development and planning team. The outcome was that the Charrette schemes, in the breadth of their creativity and technical expertise, were able to reinforce the directions the Policy process was taking.

When the public approval process raised the question whether the whole site should be given over to parkland, the backbone that the Charrette process had given the issue of sustainable development was of great assistance to Council's deliberations. With broad public support they approved the Policy Document that had been endorsed by Real Estate Services and the Planning Department and their consultants.

To now compare the starting point of the Official Development Plan with the time of the October 1998 charrette a few visible changes must be noted. The applicable site boundaries and density targets have been revised. The park area at the west of the site adjacent to Cambie Bridge has been increased and connected back to First Avenue, and the development of the City owned quadrant of SEFC is expected to yield 2.2. million square feet as opposed to earlier targets of 3 million. Depending upon what the Greater Vancouver Transportation Authority chooses to do with its lands at the corner of Quebec and First Avenue, there may also be an additional 300,000 sq.ft.

False Creek Flats, the large railyard based industrial area to the east of Main Street, is the subject of intense planning and development activity for high tech industrial uses, and the extension of the region's SkyTrain rapid transit system is now committed to reach there.

The growing synergy between South East False Creek and the False Creek Flats is evidence of the broad impact of sustainable development issues in the implementation of the City of Vancouver's evolution. Initiatives such as the SEFC charrette are playing their part at both the macro scale of city shaping and the micro scale of community building and the daily life of the citizen.

Graham McGarva
BAKER MCGARVA HART ARCHITECTURE

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# EXECUTIVE SUMMARY

The 1987 Brundtland Report, sponsored by the United Nations, introduced the term "sustainable development"—development which meets the needs of present generations without compromising the ability of future generations to meet their needs. In response to the global issues raised in the Brundtland Report, many jurisdictions began work on ways to reduce negative impacts on the environment. This presents challenges to development planning.

Canada Mortgage and Housing Corporation (CMHC) has been a leader in research on issues of sustainable development with its work approaching the environmental and social impacts of development from many angles. Because of the important role cities will play in the 21st century, how they are planned and designed will largely define the environmental impacts associated with contemporary life. Some models of sustainable communities have been developed, but most have had suburban characteristics, especially in terms of density. With the urbanization of Canada and other nations, high-density development will become a primary form of housing and development in many world cities.

The Southeast False Creek (SEFC) sustainable neighbourhood planning project is an initiative to redevelop approximately 32 hectares (79 acres) of industrial land on the False Creek waterfront, in the downtown of the City of Vancouver, as a residential neighbourhood for between 8,000 and 10,000 people. Southeast False Creek is being designed to embody the principles of sustainable development in a manner appropriate to the scale, location, context, opportunities and constraints of the site.

This report summarizes the results of a design charrette focussed on approximately 19 hectares (47 acres) of city-owned land within the study area. A charrette is a two- to five-day workshop of community leaders, public officials, professionals in the various specialties (e.g., architects, engineers, ecologists) involved in the project and citizens who work together to develop alternatives for a neighbourhood or community project. For the SEFC charrette, emphasis was placed on long-term economic, social and environmental sustainability. The SEFC charrette was held in October 1998 to explore the implications of policies set out in an SEFC policy statement, which had been proposed to guide the development of the SEFC. The lessons learned from this charrette about high-density, sustainable, urban development are completely transferable to all other Canadian cities. The charrette was held at the conclusion of 18 months of research and public consultation to create a draft policy statement for the SEFC and develop a framework report.

The SEFC policy statement identifies goals and objectives for the site, examining many development issues. Many conventional issues are addressed in this policy statement as well as key issues in sustainable development including energy, resources, waste, ecosystem and habitat integrity, global climate change, pollution, food security, social health and economic stability.

## SEFC Charrette Goals and Objectives Goals and Objectives

The primary goal of this charrette was to provide politicians, staff, consultants and the larger community with several conceptual development options for the SEFC site, each of which represents a clear vision of what a community built in conformance with the proposed policies would be like.

### Charrette objectives included:

- Test the efficacy of those aspects of the proposed policy statement and the performance targets that would be manifest in urban design before making any attempt to apply them.
- Create a setting in which leading British Columbia designers could exchange ideas and viewpoints with outside experts in the field of sustainable design.
- Establish new, more sustainable, urban typologies to guide the planning and design of the SEFC site. These typologies would then be used as prototypes for other sites.
- Illuminate the connection between sustainability and livability.
- Provide a conduit for public participation and dialogue with regards to the future of the site.
- Make the sustainability functions of the site both transparent and didactic so the SEFC could serve its residents as well as educate the world.

## The Charrette Planning Process

The City of Vancouver engaged the services of two professionals with extensive experience in design charrettes, particularly, charrettes exploring sustainable development. Participants included three design teams, one resource team and city staff. Participant selection was ultimately by invitation with fairly specific criteria. Each design team had seven professionals and four students. The design team profile included:

- two architects;
- two landscape architects;
- one developer/development consultant;
- one planner/regulator; and
- four University of British Columbia (UBC) students.

A resource team provided additional specialist knowledge in such areas as alternative building design, energy efficiency and alternatives, transportation, aquatic habitat and contaminated soils. Additional resources were "on call" from CMHC offices in Ottawa.

## Key Issues, Requirements and Targets

Sustainable urban development issues draw together the conventional concerns of city planning and development with the need to enhance the integrity of a site's ecological systems. The primary issues requiring attention for the SEFC included:

- land and water (fresh water, open space, soil);
- the built environments (public spaces, community facilities, streets/parking, buildings);
- building design and performance (energy, heights, site size, views); and
- waste management (graywater, blackwater, household and green waste).

## Charrette Description

The Charrette started on a Tuesday evening and ended at Friday noon. It was held in a large seminar room that provided views of the site. It is worth noting that even with all the activity and creative energy occurring in one room noise was never a problem. Participants worked and ate together as they generated ideas, sought team consensus, explored policies, and generated and tested ideas and plans. The public was invited to the presentations and subsequent discussions. The open dialogue included reflections on various ideas presented, and on the opportunities and constraints provided by policies informing the charrette. The latter discussion provided valuable feedback for city staff in their ongoing policy-development work. Post-charrette, teams were provided with time and resources to "polish" their drawings and summarize their work.

## Charrette Outcomes

Charrettes demonstrate alternative responses to a single problem. Despite the demands of time, task complexity and the variations in approach to the challenges in this charrette, each team embodied the guiding principles of sustainability in its work. While the solutions were different, common priorities, achievements and design directions emerged. These directions are applicable in varying degrees to any urban development.

## Outcomes Common to all Charrette Solutions

| | |
|---|---|
| **Rainwater** | All teams found ways to manage *all* the site's run-off on the surface. |
| **Working open space** | All teams designed the open space to integrate closely with the street system and to serve as both recreational and ecological infrastructure, including areas for recreation, wildlife habitat, urban agriculture, education and water management. |
| **Soil contamination** | All teams used a range of strategies to address the site's contaminated soils including land-use patterns, on-site treatment and capping/entombment. |
| **The greenways** | All teams created a network of greenways throughout the site programmed for transportation, recreation, habitat and water management. |
| **The waterfront** | All teams explored a diversity of treatment along the waterfront walkway/bikeway, including marshes and habitat areas. |
| **Housing** | All teams provided housing for 5,000 residents in a manner which encouraged diversity of age, family type, tenure type and income, and provided immediate access to community and retail services. |
| **Commercial/office/ industrial uses** | All teams provided space for commercial, office and industrial activity. Much was situated in a mixed-use scenario and focussed along 1st Avenue. |
| **Community centre and school** | All teams provided a multi-task facility designed as a community centre and school, focussed around a primary public open space. |
| **Heritage** | All teams designated the Domtar Building in the centre of the site for public uses, ranging from the community centre to a retail market. All teams emphasized the historical connection between the Domtar Building and the original False Creek shoreline. |
| **Day care** | All teams provided extensive day care in a range of facilities. |
| **Street design** | All teams integrated the site into its context by extending the existing city grid into the site. While accommodating the automobile, they focussed on pedestrians, cyclists and transit, reducing automobile access to the site to a minimum. Streets were designed with narrow widths, traffic-calming measures and water management principles such as permeable paving under parking areas. All streets were intended to be an intrinsic part of the public open space and social life of the neighbourhood. |
| **Parking** | In accommodating one space per unit, all teams located parking on the streets, in smaller pockets and underground on the southern edge of the site, where the soil conditions were less costly to deal with. |
| **Development parcel size** | All teams explored a range of parcel size to encourage incrementalism, flexibility, diversity and a finer grain of development. |
| **Building heights and design** | All teams provided a range of building heights. All the plans had the taller buildings in the east, where taller buildings exist at present. Proposed buildings were located and designed to be energy efficient, to have "green" roofs, taking advantage of solar gain, both passively and actively. |
| **Waste management** | All teams used the open space ecological infrastructure to manage run-off as well as various amounts of graywater from buildings. On-site sewage treatment systems were also integrated into the plans. Recycling and composting systems were incorporated into each design. |
| **Infrastructure** | All teams approached the provision of electricity, heat and water creatively, to accommodate incremental development, technological advancements in the future and high levels of efficiency. |

Differences in the designs broadened the discussion on ideas and options for sustainable urban development, fulfilling the charrette's goal of providing Council, staff, consultants and the larger community with options and feedback on the implications of the development impacts of the proposed policies.

Commonalities demonstrated a shared vision of many aspects of sustainable urban development. As a result of these design explorations, changes will be considered to the proposed policies for the site. More important, the power of a charrette in exploring alternatives for city development standards has encouraged the City to consider changes to policies (including by-laws and regulations), plans, approaches and even to the mandates/functions of some municipal departments/operational units, to address the principles and imperatives of sustainable development more efficiently.

# INTRODUCTION

How cities are planned, designed and developed affects the health of ecosystems, communities and local economies. In 1987, the United Nations-sponsored Brundtland Report, introduced the term "sustainable development" as "development which meets the needs of present generations without compromising the ability of future generations to meet their needs."

The Brundtland Commission identified the close connections between the health of the economy and of environmental systems. The report recognized that many current development and resource management practices are damaging the Earth's ecosystems and that if they were continued through the next century, large-scale environmental and economic problems would result. In response, many jurisdictions began working on ways to reduce negative impacts on the environment.

At the same time, global urbanization trends indicate that within the next century most of the world's population will live in cities. Globally, Canada already has one of the highest percentages of its population living in cities. With the urbanization of Canada and other nations, high-density development will become a primary form of housing and development. As a result, how cities are planned and designed will largely define the environmental impacts associated with contemporary life.

## The Southeast False Creek Project

The City of Vancouver has been working for many decades to improve the environmental quality of the City and its region. The latest step is the Southeast False Creek (SEFC) sustainable neighbourhood planning project: an initiative to redevelop about 32 hectares (79 acres) of industrial land on the False Creek waterfront, in downtown Vancouver as a residential neighbourhood for between 8,000 and 10,000 people. In accordance with regional growth management strategies, the City is developing downtown housing for up to 50,000 more residents. The aim of the SEFC project, and the charrette in particular, is to demonstrate that a dense urban development can be sustainable in a manner appropriate to the scale, location, context, opportunities and constraints of the site.

This report summarizes the results of a design charrette, partially funded by Canada Mortgage and Housing Corporation (CMHC), in partnership with the City of Vancouver, held in October 1998, to explore the implications of sustainable guidelines and separate development policies proposed for the SEFC, particularly about 19 hectares (47 acres) of city-owned land within the 32-hectare (79-acre) study area. A core principle in the planning of the SEFC is that it should be a transferable model of high-density sustainable urban development. As a result, the lessons learned from this charrette are transferable to other Canadian cities and demonstrate that a dense urban development can be sustainable. The outcomes of this charrette, therefore, demonstrate many principles which planners and designers can use in developing cities in the future.

## The SEFC Planning Process

The planning of the Southeast False Creek neighbourhood officially began in the summer of 1997 and has taken several years. Before the 1997 start, several studies were conducted on the levels of soil contamination and the economic feasibilities of various development scenarios for Southeast False Creek.

The first stage of the planning process (Summer 1997-Spring 1999) focussed on a policy statement to guide the development of the site. This included broad public participation. As part of this initial phase, the Planning Department of the City of Vancouver commissioned a report from the

Sheltair Group during the winter of 1997-98, entitled *Visions, Tools and Targets: Environmentally Sustainable Development Guidelines for Southeast False Creek*. The report presented a framework of principles, practices and targets for the SEFC that essentially structured and defined a vision of sustainability for the neighbourhood. The issues identified and the performance targets offered in this report helped set the objectives for the design charrette, which was also part of the first stage, as well as for the entire planning process for the community.

The second stage of the planning process (Spring 1999-Fall 1999) focused on creating an official development plan for the site in accordance with the policies developed in the first stage. Many ideas from the design charrette were incorporated at this and subsequent rezoning stages.

The third stage (Fall 1999-Fall 2001) will focus on rezoning the land for development. During this stage, sub-areas of the site will be zoned and guidelines developed for the design of the public realm, the streets and parks, as well as the basic massing and general form of development. Bylaws and legal agreements will be enacted to ensure development takes place in accordance with both the policy statement and the official development plan from the first two stages.

## The SEFC Policy Statement

The SEFC policy statement identifies goals and objectives for many development issues including integration with existing neighbourhoods which encircle False Creek, providing access and amenities, and a mixed land-use strategy with a predominance of housing. Parks, a school, a community centre and employment of many kinds will be available in this family-focussed neighbourhood.

Key issues in sustainable development, addressed in the SEFC policy statement, include energy, resources, waste, ecosystem and habitat integrity, global climate change, pollution, food security, social health and economic stability.

The policy statement was endorsed and accepted by Vancouver City Council in late 1999, after a further series of public meetings and presentations.

# 2. RATIONALE FOR THE DESIGN CHARRETTE

Sustainable development principles present challenges to development planning. A charrette—an intense workshop in which design professionals, public officials and citizens come together for two to five days to develop alternatives for a neighbourhood or community project, in this case with an emphasis on long-term social, economic and environmental sustainability—can greatly benefit a planning process. Besides providing an opportunity for a multi-faceted dialogue where all the players are equals, the charrette offers several advantages.

## Refine Policy Directions

- The charrette provides the best opportunities for holistically exploring a variety of creative solutions to sustainable development challenges.

- The multidisciplinary nature of the charrette provides a unique opportunity for realistic, innovative solutions, which emerge *only* when disciplines help each other achieve their objectives.

- The general and detailed analyses help ensure policies are headed in the right direction by testing scenarios. The design explorations allow everyone to see the implications of policies and to clarify policies before any fine-tuning takes place.

## Broaden Discussion of Issues and Ideas

- The charrette provides a way of exploring many ideas, which are not usually discussed. This allows for increased education of all stakeholders and gives members of each discipline an opportunity to learn from each other. Creative, multidisciplinary ideas emerge as solutions to complex problems.

- The charrette allows for "idea scoping" and problem solving beyond the traditional development dialogue between development consultant/architect teams and a city.

- By providing proof that a new policy is feasible and highly desirable, the charrette encourages all stakeholders to consider more seriously the widespread practicality of environmentally responsible design practices and other sustainable development principles.

## A Venue for Wider Involvement

- Drawings from the charrette provide an excellent education and discussion tool with which to engage an audience other than designers and planners, including the public and the media.

- A charrette is an excellent way to get the necessary range of professionals involved in the project. Most professionals are only involved through a consultancy contract, and these are generally scarce. The wider range of professionals and stakeholders brings the appropriate holistic approach to the project.

- Most charrette participants have not been closely involved in the policy-making process that led up to the charrette. Asking these participants, as objective professionals, to confirm or question the policies provides valuable input.

- The objective confirmation of the feasibility and implications of many sustainable development policies helps to de-politicize the work of consultants and planners previously involved in the process.

- A charrette is an interesting event that attracts a lot of interest from the public, media and professional communities. It builds the profile of a project and provides valuable input from the interested "non-professionals" who have become an integral part of the process. All the attention helps to further educate those who show interest in the importance and feasibility of sustainable urban development.

In summary, charrettes are an excellent way of addressing complex new issues in urban planning which arise from introducing the agenda of sustainability. Reasons include their multidisciplinary nature, the excitement of the "event," the clear drawings of the ideas which result, their tendency to be creative and non-political, and their educative nature of both participants and observers.

In short, they bring together the views of the public, design professionals and the political community in a non-confrontational manner and result in creative solutions to complex development opportunities.

# 3. THE SEFC DESIGN CHARRETTE

## Goals and Objectives Goals and Objectives

The primary goal was to provide politicians, staff, consultants and the larger community with several conceptual development options for the SEFC site. Each option would represent a clear vision of what a community built in conformance with the proposed policies would be like.

Charrette objectives included:

- Test the efficacy of those aspects of the proposed policy statement and the performance targets that would be manifest in urban design before making any attempt to apply them.
- Create a setting in which leading British Columbia designers could exchange ideas and viewpoints with outside experts in the field of sustainable design.
- Establish new, more sustainable, urban typologies to guide the planning and design of the SEFC site. These typologies would then be used as prototypes for other sites.
- Illuminate the connection between sustainability and livability.
- Make the sustainability functions of the site both transparent and didactic so the SEFC could serve its residents as well as educate the world.

## The Planning Process

Early on, various professional designers and academics, involved in the neighbourhood planning process, strongly advocated that a design charrette be included in the work program to explore the implications of the proposed policies. City staff concurred, recognizing that the input of many professionals would be valuable and would give the policies credibility. Furthermore, the drawings from the charrette would greatly aid in the public consultation process around the SEFC.

The City engaged the services of Dr. Fiona Crofton of the ORCAD Group and Patrick Condon, a professor of landscape architecture at the University of British Columbia (UBC) and a principal in the landscape architecture firm, Moriarty Condon, to help develop and manage the charrette. Both professionals brought extensive experience in design charrettes and, in particular, charrettes exploring sustainable development. Dr. Crofton had also been involved in the SEFC planning process during the previous year, as a facilitator of a multidisciplinary policy advisory group.

### The participants

Participants included three design teams, one resource team and city staff. The participant selection process included several steps. Staff made a list of recommended participants for the charrette organizers. Selection criteria for the invited team members included:

- understanding of the concept and principles of sustainable development, knowledge of implementation strategies and approaches, and awareness of issues arising out of implementation attempts;
- strong communication skills including interpersonal and group process skills and an ability to work in teams; and
- specialized knowledge and experience appropriate to the desired team profile.

### Team configuration

Each design team had seven professionals and four students. The team profile included:

- two architects (one experienced in large-scale urban development, generally of the more conventional/traditional form, and one with

knowledge and experience in "green" planning and "new urbanism" );
- two landscape architects (following the same profile as architects);
- one engineer;
- one developer/development consultant;
- one planner/regulator; and
- four University of British Columbia (UBC) students (two from architecture and two from landscape architecture). All student participants had completed a design studio focussed on the SEFC before the event.

A resource team provided additional specialist knowledge in such areas as alternative building design, energy efficiency and alternatives, transportation, aquatic habitat and contaminated soils. Additional resources were "on call" from CMHC offices in Ottawa. The resource team products developed during the charrette are included as Appendix C of this report. Additional resource documents, including a wide range of CMHC reports on issues related to sustainability, were made available to the design teams throughout the process.

### Design team structure

Design team members functioned as equal partners using a shared leadership, co-creative approach. Each team was responsible for testing policy by generating design options for the SEFC and giving particular attention to areas where policies might be overly restrictive or insufficiently specific in providing direction for the development of a sustainable community. Planners/regulators on each team were responsible for documenting discussions and decision-making processes related to policy issues. Students participated as apprentice members of the team. They shared information gained from their studio experience (which was guided by the same design program as the one used in the charrette), provided help as instructed to complete charrette tasks and provided additional "hands" for drawing and other visual requirements.

In addition to the collective expertise of the teams, another "team" was brought together during the charrette to ensure that all the design teams had the benefit of particular kinds of knowledge and experience. This additional group included the three design-team engineers and three engineers from the resource team. The group met for about two hours to share knowledge of state-of-the-art technologies and evolving approaches, and to discuss strategies and cost/benefit issues regarding water and waste management/treatment, bio-remediation, energy, monitoring and other concerns related to the creation and maintenance of an ecological infrastructure and community sustainability in the SEFC. These discussions had implications across performance criteria and were invaluable to the formation of design team solutions.

The resource team members circulated among the design teams, reconvening as necessary to compare notes. In addition to providing information and support as requested by design teams, resource team members were also asked to articulate key issues and provide a critical examination of policy areas specific to their areas of expertise. The process design consultant acted as choreographer/facilitator of the event.

## Materials Provided

In advance of the charrette, all participants were provided with materials so they could familiarize themselves with the program opportunities and constraints.

- A **design brief** described the charrette goal, objectives, key issues and performance criteria. To ensure that design solutions represented not only personal visions of team members, but also the teams' interpretation of the City's key objectives, the design brief was based, primarily, on key documents.
    - *Urban Sustainable Development: Southeast False Creek.* City staff prepared a summary of the Vision, Tools and Targets document. This commissioned study, which had resulted from the public participation process, identified a score of different measurable sustainability performance targets for the SEFC.

- *Southeast False Creek Sustainable Neighbourhood: A Policy Statement to Guide Development* (Draft).
- A synopsis of the Creekside Landing Plan, prepared by Stanley Kwok Consultants for the City of Vancouver.

The design brief was broken into four sections.

- *Land and Water* covered issues associated with the ecological health of the site, including the water it contains and the water by which it is surrounded (fresh water, open spaces, soil).
- *The Built Environment* covered issues relating to the buildings and landscapes that will be added to the site (housing, community facilities, public spaces, streets and parking, commercial services, office spaces).
- *Building Design and Environmental Performance* covered issues relating to more sustainable building construction (energy, heights, site size, views).
- *Cycles of Growth and Waste Decay* covered issues relating to material flows both on to and off of the site (graywater, blackwater, household and green waste).

- An **orientation package** (see Appendix A) included the charrette agenda, team information, specification of roles and responsibilities, and various background papers including copies of the key source documents that informed development of the design brief.
- **Opportunities for site visits** were made available before the opening of the charrette so participants could become familiar with the site environment and context.

Highlights of the design brief were presented at the charrette opening, and time was provided to allow participants to ask any clarifying questions. At the opening, participants were also provided with:

- a **cheat sheet** (see Table 1) of issues to be dealt with providing quick reference to primary objectives; and
- a **summary sheet** for recording answers to key questions (see Table 2) enabling participants to track their decision making in all the key areas identified in the brief.

Table 1
SEFC charrette design program cheat sheet

| Category | Performance Threshold | Design Objective | Quantities |
|---|---|---|---|
| **Rainwater** | Hold and absorb all rainwater on site or clean completely before discharge. | Reveal the operation of the rainwater system through design. | 100% recharge/clean.<br>No more than 50% impermeable. |
| **Working open space** | Clean water, provide habitat, improve soil.<br>Plazas, roads and public spaces should provide social and ecological sustainability.<br>Provide recreation for the community both on the site and off.<br>Provide space for community gardens for those who have none on roofs. | Make working green a powerful aesthetic.<br>Express new ideas of "re-creation" in form. | 60% of green space has habitat value.<br>1.1 hectares (2.75 acres) of "sustaining" space per 1,000 population.<br>12.5% of produce grown on site. |
| **Soil** | Avoid human exposure to hazardous soils.<br>Heal degraded soils wherever possible. | Make "healing soils" a design aesthetic. | |
| **Public green** | Richly layer green into buildings and infrastructure for biological, energy, amenity and food production purposes.<br>Link all parts of the site to a continuous waterfront seawall walk which can be pulled back from the shore in places. Shore edge should have vastly enhanced habitat. | Produce a new vision for a more sustainable and rich seam between city and sea, earth and water, structure and plants. | 80% of foreshore has habitat value.<br>Plants on 25% of roof area. |
| **Built structures** | The Domtar Building should be converted for some form of public use.<br>Mix residences, commercial and office as appropriate.<br>Explore live-work and workshop industrial as a component of the community.<br>Insure basic needs can be met within walking distance. | Create a vibrant mixed use community that integrates with the surrounding community but is also a special place.<br>Let sustainability be obvious in form. | 297,280 m² - 315,860 m² (3,200,000-3,400,000 sq. ft.) not including cultural, recreational, institutional space.<br>Gross FSR of 1.6 on entire site inclusive of roads and parks. |
| **Residences** | Provide housing for over 5,000 people.<br>Provide housing for all ages.<br>Provide housing for all incomes.<br>Provide housing for all family types, especially those with children. | A sustainable community is an equitable community.<br>Equity should be apparent in the design. | Avg. unit size = 93 m² (1,000 sq. ft.).<br>278,700 m² (3,000,000 sq. ft.) residential space.<br>Net FSR average of 3<br>20% low income. 35% families of which 10% are low income. |
| **Parking** | Provide one space per unit on average.<br>Locate parking on streets, in surface lots, under structures or in parking decks.<br>Some parts of the site can have fewer than one space/unit if other sites compensate. | Avoid "dead street syndrome" caused by underground parking.<br>Make structured parking convertible. | 1 space per unit on average. |

| Category | Performance Threshold | Design Objective | Quantities |
|---|---|---|---|
| **Commercial life** | Mix commercial activities with residential as much as practical.<br>Provide a commercial centre.<br>Combined residential, workshop and commercial may be permitted.<br>Provide services to the community beyond the site.<br>Use commercial activity to add life to streets. | Express the public nature of commercial life.<br>Design streets to serve commercial purposes. | 18,580m$^2$ (200,000 sq. ft.) (more or less is possible).<br>0.3m (1 ft.) commercial space for each 4m (15 ft.) residential.<br>Max. <350m res to commercial. |
| **Offices** | Provide office space for neighbourhood services only. | Express the public nature of office activities as appropriate. | 9,290m$^2$ (100,000 sq. ft.) (more or less is possible). |
| **Industry** | Consider incorporating new types of workshop-scale industry—compatible with or even supportive of residential uses.<br>Mix workshop-scale industry in mixed-use structures and settings as appropriate. | Make industry visible.<br>Let it enliven community centre(s). | 32.5m$^2$ (350 sq. ft.) of space per job.<br>City threshold for this site is 1,000 jobs (office, industrial, commercial). |
| **School** | School will serve SEFC site and surrounding community.<br>School may be part of larger structure or block with other public and private uses.<br>School must have direct access to active and passive recreation areas.<br>Developing the school in a mixed use facility with the community centre is encouraged | Take advantage of school program to express civic space.<br>Use school activities to enliven public realm. | 3,252 m$^2$ (35,000 sq. ft.) elementary school. |
| **Community centre** | Community centre will serve both the SEFC and larger context.<br>Centre may be part of larger mixed-use structure or block.<br>The function of the centre can be examined, e.g., should it include functions usually associated with libraries? galleries? playhouses?<br>Centre must have direct access to recreation areas. | Take advantage of community centre program to express civic space.<br>Use community centre activities to enliven public realm. | 2,323 m$^2$ (25,000 sq. ft.) community centre. |
| **Day care** | Spaces must be in four or more locations.<br>Some portion of the total may be in home day care settings. | Children should be seen and heard. | 180 spaces. |
| **Street and movement way design** | Impact of car to be minimized.<br>Allow for all transportation modes in a continuous comprehensive system.<br>Connect on-site streets to off-site streets.<br>Insure universal access. | Express the primacy of the pedestrian. Maintain view corridors through site down street ends. Design to minimum allowable widths. | No res. > 350 metres from transit.<br>18.3 m (60 ft.) wide "sea wall" walk, typical.<br>60% of "street" surface for non-car modes. |

| Category | Performance Threshold | Design Objective | Quantities |
|---|---|---|---|
| **High street** | Consider possibilities for 1st Avenue to be a "high street." If not 1st, then where? | Community heart and commercial centre—can they be one thing? | |
| **Streetcar** | Locate the proposed "pedestrian scale" streetcar line through the site. | Use streetcar as urban amenity and means to enliven street. | Enters on 1st Avenue and will probably stay on 1st Avenue on western half of site. Exit point at the east may vary. |
| **Sustainable streets** | Make streets that clean water, provide habitat, accommodate people and enhance social interaction. | Make "sustainable streets" a powerful new aesthetic. | |
| **Parcel size** | Provide a block and parcel plan. The City desires finer grain development than in previous projects. Your master plan might show parcels rather than buildings. | Parcel size is the most significant influence on sense of urban scale. | Provide 30 - 300 parcels, individually serviceable. |
| **Building energy performance** | Cut energy demand of buildings. (Most of this will be achieved through building design details beyond scope of this exercise. Building plate size and shape are an important exception to this rule.)<br>Orient buildings for solar and avoid blocking solar access. | How do energy-related considerations of building plate size and shape influence urban design for this site? | 75% of buildings with good solar orientation.<br>90% of energy from renewable sources (renewable includes hydro-electric)<br>5% of energy used produced on site. |
| **Building heights and massing** | Buildings at southeast corner of the site can be up to 91.4 m (300 ft.).<br>Reduce or eliminate shading of open spaces and other structures during all seasons.<br>Provide as many ground-oriented units as possible for families with children.<br>Soil contamination makes deep excavation especially difficult on west end of site. | What is the appropriate urban image for this sustainable community? | 91.4 m (300 ft.) maximum.<br>20 m wide (65.6 ft.) bridgehead no-build zone. |
| **Waste systems** | Treat graywater and blackwater on site whenever possible.<br>Compost all green wastes generated on the site.<br>All multi-family buildings to have recycling system. | Take advantage of educational possibilities when locating systems. | 25% of SEFC sewage treated on site.<br>Reduce solid waste to 200kg (441 lb.)/person/year. |

| Table 2:<br>Key report questions |
|---|
| **Rainwater**<br>• How do you propose to handle the rainwater that falls on the site?<br>• Did you find a way to recharge 100 per cent of the rainwater that falls on the site? |
| **Working open space**<br>• How do you propose to make green spaces produce multiple ecological, social and recreational benefits?<br>• Does 60 per cent of your open space have habitat value?<br>• Were you able to provide 1.1 hectares (2.75 acres) of open space per 1,000 population?<br>• Are there unprecedented/atypical open space types counted in this total? |
| **Soil**<br>• Were you able to propose a way of restoring a functioning ecosystem in the context of toxic soils? |
| **Public green**<br>• Were you able to propose a strategy for layering green into buildings?<br>• How do the districts of your design link to the seawall?<br>• How has the seawall been made aquatic habitat friendly? |
| **Residences**<br>• What is your estimate of the population of this community?<br>• Are all age groups and family types accommodated? Special emphasis on one group? |
| **Parking**<br>• Did you provide one parking space per unit?<br>• How was parking handled? Under buildings? On streets? In common decks away from buildings? |
| **Commercial life**<br>• Where is commercial activity concentrated? In one location? In one main and other minor nodes?<br>• How many square metres (feet) of commercial space did you provide? |
| **Offices**<br>• Approximately how many square metres (feet) of office space did you provide?<br>• Where is it located? |
| **Industry**<br>• How many square metres (feet) of industrial/workshop space did you provide?<br>• What type of space?<br>• To what extent do you see industry mixed with other uses, i.e., as a means to enliven the community? |
| **School**<br>• Where did your team propose to locate the 3,252 m² (35,000 sq. ft.) school? In a separate building? As part of the community centre? As part of a larger mixed-use building? As part of a block? |
| **Community centre**<br>• Where did your team propose to locate the 2,323 m² (25,000 sq. ft.) community centre? In a separate building? As part of the community school? As part of a larger mixed-use building? As part of a block? Does your centre incorporate activities not generally associated with community centres? |
| **Day care**<br>• Where did you locate day care?<br>• In what kind of spaces? |
| **Street design**<br>• In one sentence, what was your basic strategy for segregating, calming and/or incorporating the car in the district? |

**Streetcar**
- Where did you locate the streetcar?

**Sustainable streets**
- What street systems also incorporate ecological functions?

**Parcel size**
- How many development parcels do you propose?
- Are they intended for party wall structures? Freestanding?

**Building energy performance**
- How important was solar orientation in determining building form? Natural ventilation?

**Building heights and massing**
- What was your mix of low-rise to highrise structures?
- Where are the families with children intended to live?

## The Charrette Unfolds

### Day one

City staff set up the workspace and tours of the site were given to interested participants. The charrette started more formally in the evening with a light supper. Dr. Crofton facilitated a group-wide discussion and orientation session which included several presentations. Larry Beasley, Co-Director of the Vancouver City Planning Department, welcomed everyone and discussed the City's work on the SEFC. The development consultant team the City had hired to complete a development plan for the SEFC presented some of the work it had done on the project over the previous two years. City staff who were not part of the teams were present at this meeting to give answers to questions raised by participants. The evening concluded with directions for beginning work the next day.

### Day two

Each team started its work in different ways with Dr. Crofton calling everyone together, as required, to clarify various issues. A tour was again provided to some who wanted to revisit the site. Breakfast and lunch were served in the workroom but at 5 p.m. city staff took all the participants out for dinner at a nearby restaurant. Some team members returned to work that evening.

### Day three

The teams worked all day again with breakfast, lunch and dinner provided in the workroom. The last half of the day was spent drawing up the design schemes.

### Day four

All participants and many city staff gathered for breakfast. The teams began to set up their presentations. Dr. Crofton facilitated the presentations and accompanying discussions. At the end of the morning, lunch was served along with celebratory champagne.

## Summary and Comparison of Design Team Work

Teams started with the same "marching orders" and information but came up with different urban form responses. However, they all dealt with the same issues and, generally, met the same targets. This demonstrates how ecological performance can be designed into most types of urban neighbourhoods. As a result, many lessons and recommendations for every city in Canada can be drawn from these proposals as suggestions on how to develop in a more environmentally sustainable manner.

The presentations of the final products from each team illuminated solutions and issues the teams felt were important to explore and test. While the drawings and summary reports of each design team constitute the primary products of the charrette, the following provides a brief synthesis of the ways in which teams responded to design objectives and targets provided in the design brief. Complete team reports can be found in Part II of this report.

### Rainwater

All the teams met the objectives of 100 per cent recharge and system visibility. Collection and cleaning were achieved via rooftop capture, swales and marsh, reed bed, lagoon and estuary; leaching may reduce the possibility of 100 per cent treatment. Captured rainwater (as well as graywater) was intended for irrigation and toilets. There is the possibility of future water purification sufficient to support domestic supply.

### Working open space

All teams attended to the ideas of habitat, recreation and working green objectives, generally by taking a creative and transformative approach to more traditional notions of open space declared to be part of the foundational ecological infrastructure of the site. Approaches incorporated private and community gardens, urban agriculture, water treatment and re-use, and opportunities for recreation and education. Spaces varied from urban (courtyards, quiet enclaves) to heavily landscaped settings.

### Soil

The teams struggled with the issue of contaminated soils and had to proceed without definitive information. All teams capped certain areas of the site (particularly the northwest part) and approached design with on-site remediation as a basic premise. Solutions included a berm/hill as a depository of heavy metal soils in the west end of the site and an east-west phased development approach to take advantage of quickly evolving soil remediation technology. All ecosystem restoration efforts and drainage systems are to be constructed above contaminated soils.

### Public green

Working open space becomes part of the public green in all the designs, with water features incorporated as a key component of the public green. Ideas included roof gardens (one team has all roofs planted and includes some vertical planting on south and west walls), courtyards and, with concern for urban food security, areas for urban agriculture. In general, the idea of "continuous swath" versus "nodes" of green is reflected in all the designs. Green spaces occur in every portion of the community and are brought to buildings via path/roadway swales which also connect the community and surrounding neighbourhoods to the waterfront.

Seawall treatments varied although all tended toward a softer, more natural edge, hospitable to a range of species. All teams explored the possibility of revealing the historic shoreline edge, most notably near the Canron Building, and making that area a focal point, even a "destination location." For example, in one design the existing slip is enlarged into an inlet and freshwater wetland which also serves as part of the blackwater treatment system.

### Residences

Teams had no apparent difficulty in achieving (or exceeding) the housing requirements. This is evidenced by the range of building types (townhouses, apartments, lofts, live-work, rental), convenience of access to services, and location of schools and day care. (The number of proposed units ranged from 3,000 to 3,500.

### Parking

Soil conditions were a primary consideration in locating parking areas. All the teams placed underground garages (and most parking generally) in mixed-use buildings along 1st Avenue. On-street parking was key to all designs with an emphasis on permeable surfaces with linkages to treatment lagoons/marshes. One team included some smaller parking pockets in car-tolerant access ways. All the teams met the one space per unit target but felt the needs in this community may be less and a lower standard may be viable.

### Commercial life

All teams sought to provide all daily retail and service needs on site. Commercial life (retail) was concentrated along 1st Avenue with additional opportunities around the Domtar Building/ Community Centre. Office space was focussed along 1st Avenue, with home office and live-work combinations throughout the site. Industry was interpreted to mean light industry (including workshops similar to Granville Island). Two teams integrated industrial and workshop activities into mixed-use buildings mainly along 1st Avenue; the third team placed an 18,580 m² (200,000 sq. ft.) non-noxious type of industrial workshop in a flexible courtyard next to the Cambie Street Bridge. Space allocations, *excluding live-work spaces*, ranged from 9,290 m² to 18,580 m² (100,000 to 200,00 sq. ft.) for retail and service; 2,323 m² to 18,580 m² (25,000 to 200,000 sq. ft.) for offices; and 4,645 m² to 18,580 m² (50,000 to 200,000 sq. ft.) for industry.

### School

The vision of a community school was common to all the teams. Two teams located the school within the heart of the community directly associated with the Domtar Building/Community Centre. Both of these teams spoke of the opportunities this presented for children's contextual learning and for bringing the broader community together. The third team created another focal point by locating a free-standing school in the western edge of the site adjoining a treatment marsh (educational opportunity) and oriented to downtown views. In all cases, the school is intended to be seamlessly interwoven with the life of the community as a whole.

### Community centre

The Domtar Building was identified by all the teams as the heart or nerve centre of the site. It became a multi-purpose community centre providing a variety of programs and spaces for local groups within the greater neighbourhood and including, possibly, a public market. One team also proposed two additional "centres" around the inlet. The first, a boathouse on the waterfront at the north end, would support small boat and kayak activity and storage, and serve as a focal point for water-oriented civic celebrations in addition to providing spaces similar to those found in the Domtar Building. The second, the Crystal Palace, a solar aquatic blackwater treatment and greenhouse facility, was located at 1st Avenue; it would serve as an example of a functioning "living machine," and as both a destination feature and gateway to the site.

### Day care

All teams incorporated day care in some form of mixed-use buildings. Two teams placed day care in the vicinity of, or adjoining, the Domtar Building with a day care in a live-work building or in the school in a multi-purpose facility. The other team proposed three day care facilities, each serving one of the primary sub-districts of the site. As with the other two teams, one day care was associated with the community centre.

### Street design

All the teams extended existing north-south streets into the site and reflected a tendency toward reducing the primacy of the car, making it secondary to circulation needs of pedestrians and foot-wheeled movement. There were slight variants in response to the car. Design approaches included minimized road widths, a range of traffic-calming measures, reduced vehicle movement and access within the site, and discouragement of traffic on interior streets. Public transit was supported via widened sidewalks and pedestrian surfaces placed at all stops served by the anticipated streetcar running along 1st Avenue. The streetcar is expected to reduce automobile needs (in concert with transit linkages), reduce automobile speed, create a quieter high street than 2nd Avenue and provide an animated corridor accessible to the larger neighbourhood.

Street designs also illustrate attention to sustainability and provide an example of the intentional multi-functionality of many design elements. In this case, streets are not only a means of access and circulation; they have a function as "streams" and are part of both the aesthetic and the ecological infrastructure of the site. All streets were designed to collect and channel stormwater to collection and treatment areas. (Paved streets direct water to swales and/or permeable parallel parking areas linked to lagoons.) In addition, almost all streets are planted with trees or shrubs and are intended to have some degree of habitat value and, on internal residential streets, to create social spaces for community residents.

### Parcel size

Team responses to block and parcel planning varied and suggest support for numerous parcels of a variety of sizes and a desire to encourage a hierarchy of finer grain development, flexibility, diversity and greater participation by different architects and by smaller builders and developers. Proposals included subdividing into "several hundred parcels" with no parcel greater than 0.4 hectares (one acre) and large building complexes consisting of compositions of ownerships; a wide variety of sizes and types with 30 plus parcels; and a traditional Vancouver city block (perhaps somewhat smaller) as the basic building block with as many as 16 to 20 lots in a block and a proposed maximum limit of four lots as a contiguous parcel.

### Building heights and energy performance

Responses to height ranged from predominantly low rise across the whole site with a maximum of seven or eight storeys, to mostly low rise and accommodating two 12-storey highrises; to a greater and more varied height gradient (high to low, east to west) ranging from 20- to 30-storey highrises in the east to two-storey townhouses in the west. All the teams restricted structures requiring deeper excavation to areas of the site where the soil conditions were believed to be less problematic. The teams also ensured views through and over the site most notably to and from the north and south. The two teams that incorporated taller buildings in their plans were particularly attentive to siting structures to acquire solar gains and reduce shadow.

Two teams explored energy issues in more detail. One estimated that 50 to 60 per cent of domestic hot water could be supplied by solar energy (from tops of mid-rise roofs and southeast and south-west sides of towers) as a result of building orientation and design. Designed to accommodate incremental development, the plan also suggested using a cluster utility approach and establishing "utility districts." Depending on a combination of costs, regional power supply and demand, and on technological advancements, such options as photovoltaics and co-generation (for space heating, hot water, lighting, pumps, fans and electric cars) could be incorporated into later development.

Another design took advantage of prevailing winds (east and west) for natural ventilation and cooling. Given solar load control with overhangs, fins and articulated elevations, very few suites are expected to require mechanical air conditioning. While the north-south street and east-west plan provides such benefits, it is not ideal for passive solar heating and cooling during equinox seasons and forces solar collection to roofs (where it may compete with roof gardens). The plan recommends that buildings be designed to maximize solar collection surface (roofs, walls, overhangs) and, as prices drop, to facilitate future use and incorporation of building-integrated photovoltaics. In addition, the use of ground-source heat pumps is suggested for two- and three-storey buildings (the form facilitates ground-source heat pump efficiency) and their connection to an incrementally built neighbourhood heating system. This team also favors a cluster utility approach. Finally, the team estimates that 25 to 40 per cent of the energy consumption could be delivered by renewable energy generated on site.

### Waste management

The extent to which development can harvest water and use it efficiently and repeatedly is a cornerstone of sustainable design. Suggested ideas included systems to capture graywater for re-use in irrigation and toilets (low-flush preferably), living machines to process wastewater via bio-remediation instead of chemicals and wetland areas tied into wastewater processing. The wetlands/lagoons are another illustration of a design element serving multiple functions: habitat creation, public amenity, irrigation storage (storm, gray- and blackwater) and treatment. Teams dealt with household and green waste through source separation, wet garbage collection and composting on site (with the possibility of later incorporating wet garbage digesters) and the intention to re-use composted materials on site to remediate and nourish existing soils. Recycling centres were distributed throughout the site with a common recycling collection centre, including toxic transfer, located at the west end of the site and intended to serve the large neighbourhood as well as the SEFC community itself.

Table 3:
Summary of Team Results

| | Team 1 | Team 2 | Team 3 |
|---|---|---|---|
| **Rainwater** | • Capture 100% for rainwater and graywater in specially designed reed beds leading to linked treatment marshes adjoining seawall area before drainage into Creek.<br>• Graywater pre-treated.<br>• Detention areas to accommodate high-flow events.<br>• Spiral screens to remove solids. | • Capture and hold all rooftop rain water for irrigation and toilet flushing.<br>• Collected in swales and directed to surface water/graywater catchment lagoons that discharge to Creek.<br>• 100% recharge. | • Collected and treated in swales and estuaries–some leaching.<br>• Collected on hard roofs for toilet flushing–100% recharge (further 25% reduction per capita with low-flush toilets). |
| **Working open space** | • 17+ acres reserved public space.<br>• Roof gardens, courtyards, parks and re-created natural areas for recreational access.<br>• Accessible waterfront edge and heritage trail.<br>• Drainage system as a framework for linked internal open spaces that encourage indigenous species.<br>• Community gardens, fruit and nut trees.<br>• Outfalls of Brewery and China creeks run through new wetland. | • A variety of green environments, all contributing to surface water treatment.<br>• Variety of passive recreation areas.<br>• A number of blackwater treatment lagoons have running water and rich plant life.<br>• Have exceeded the open space requirements.<br>• Urban agriculture on man made hill (see soil below). | • Stormwater treatment in open space along shoreline plus several small open spaces within community that are allowed to flood during heavy storms.<br>• Curb run-off into watercourses and ponds; backyard drainage courses into stormwater system.<br>• Use treated blackwater and graywater to irrigate. |
| **Soil** | • Cap contaminated soil and contain with an impervious layer.<br>• Add about one metre of new soil to site. | • Berm slopped up to Cambie Street Bridge caps heavy metal soils. Slope reduces bridge mass and provides access to park space. | • Alder forest as a holding measure on contaminated soil near Cambie Street Bridge. |
| **Public green** | • Link every part of community with seawall.<br>• Seawall to provide more hospitable habitat.<br>• Existing slip enlarged creating central public space.<br>• Create freshwater wetland at southern end to restore historic shoreline. | • All adjacent areas to building bring green up to buildings.<br>• All building roofs planted.<br>• South and west walls with vertical plant material.<br>• Green walkways and car-tolerant access to waterfront walkway and greenway.<br>• Seawall remains as is. Waterfront trees maintained. | • Layer green into buildings through roof gardens and courtyards.<br>• Unbroken profile vs. nodes of development.<br>• More smaller green spaces vs. a big park.<br>• Rocky shoreline and path more habitat friendly than conventional seawall.<br>• Remove sheet piles over larger percentage of shoreline. |
| **Built structures** | • Emphasis on live-work situations. | • Highrise, low rise, mid-rise.<br>• Integrated uses, allows for flex use. | • All age and household groups accommodated.<br>• Most housing is ground-oriented stacked townhouses. |
| **Residences** | • 3,000 housing units.<br>• Various types, sizes and tenures with emphasis on live-work arrangements.<br>• Townhouse area near school for families.<br>• Easy accessibility to stores, services and streetcar. | • A diversity of socioeconomic and tenure types. | • Responds to diversity in lifestyles. |

| | Team 1 | Team 2 | Team 3 |
|---|---|---|---|
| **Parking** | • One space per unit, generally in underground garages in mixed-use buildings along 1st Avenue.<br>• On-street parallel parking in residential areas on top of crushed stone infiltration trenches. | • Hierarchy of accessibility along north side of 1st Avenue.<br>• Some below grade, some at curbside.<br>• Parking spaces adaptable to other uses. | • On-street parking and under 1st Avenue buildings.<br>• One space per unit. |
| **Commercial life** | • All daily retail and service needs in 9,290 m² (100,000 sq. ft.).<br>• Designed to reduce automobile use.<br>• Concentrated along 1st Avenue in ground-floor space. | • Focus on Manitoba Street and 1st Avenue.<br>• 218,580 m² (200,000 sq. ft.). | • Concentrated on 1st and 2nd aves.<br>• Scattered live/work across site.<br>• Commercial focus/courtyard.<br>• Quebec street. |
| **Offices** | • 2,323 m² (25,000 sq. ft.) mainly along 1st Avenue on ground and second-floor levels. | • 9,290 m² (100,000 sq. ft.) primarily along 1st Avenue.<br>• Work-live arrangements throughout site. | • Along 1st and 2nd avenues in flexible space. |
| **Industry** | • 6,968 m² (75,000 sq. ft.) of work space.<br>• Additional space in live-work settings throughout community. | • Mainly along 1st Avenue.<br>• Variety of industrial uses and sizes. | • Flexible courtyards next to Cambie Street Bridge.<br>• Non-noxious industry. |
| **School** | • 3,252 m² (35,000 sq. ft.) school at western edge of site.<br>• Near many family-oriented rowhouses.<br>• Focal point for part of community.<br>• School yard/play field for whole community.<br>• Adjoins a treatment marsh, i.e., increased environmental awareness. | • Part of a mixed-use building at the Domtar Building/Community Centre. | • Sharing space in the Domtar Building and adjacent to waterfront. |
| **Community centre** | • Domtar Building (town hall) and new boathouse/multi-purpose centre to accommodate a range of activities.<br>• Adaptable spaces.<br>• Crystal Palace solar aquatic greenhouse which also treats gray- and blackwater generated by community. | • Multi-purpose building and urban square at Domtar Building site. | • The Domtar Building.<br>• Partially reconstructed Canron Building as a focal point at water's edge. |

| | Team 1 | Team 2 | Team 3 |
|---|---|---|---|
| **Day care** | • In a ground-floor space in live-work building overlooking central public space.<br>• Secure outdoor play area which also encourages environmental awareness.<br>• Adjoins Domtar Building. | • Three centres in mixed-use buildings, all within easy walking distance and on pathways to principal access routes. | • Purpose-built facility in community centre area.<br>• Use part of public green for protected play area. |
| **Street design** | • Car secondary to pedestrians and cyclists.<br>• Minimum necessary roadway widths and traffic-calming measures.<br>• Interior streets discourage traffic, making them safer and encouraging sense of community. | • Hierarchy of accessibility reduces vehicle access as one moves into site<br>• Access for walking and biking has priority. | • City grid but with narrower rights of way.<br>• Porch streets. |
| **High street** | • 1st Avenue commercial heart.<br>• Domtar Building and Crystal Palace provide additional destinations. | • 1st Avenue is neighbourhood high street, connecting south of site to 2nd Avenue, the district high street. | • 1st and/or 2nd avenues become the major city connectors.<br>• 1st avenue a major urban shopping, workplace, community facility street. |
| **Streetcar** | • On 1st Avenue to make commercial corridor accessible and animate corridor's streets.<br>• Improved streetcar service would reduce car ownership and use. | • On 1st Avenue sharing two central lanes with other vehicles.<br>• Wider sidewalk and pedestrian surface at streetcar stops. | • On 1st Avenue to provide good transit linkages.<br>• Creates a quieter high street that is less busy than 2nd Avenue. |
| **Sustainable streets** | • Parking areas designed to manage and treat stormwater drainage.<br>• Paved streets direct stormwater to on-street parking built on crushed stone infiltration trenches. | • All streets have surface water gutters and most are landscaped.<br>• Gutters flow into catchment lagoons when volumes allow. | • Channels to accommodate surface run-off.<br>• Lead water into watercourses and ponds. |
| **Parcel size** | • Several hundred parcels to encourage fine-grain development and diversity. | • Minimum of 30 parcels. Most involve party walls. | • Replicate Vancouver city block with east-west, north-south streets, but shorter blocks and traditional back lanes to result in smaller parcel sizes.<br>• Maximum of four lots that could be combined into one parcel. |
| **Building energy performance** | • Maximize solar gain of all buildings.<br>• Reduce shading of public common spaces. | • Maximize solar access, use of natural ventilation (cross-ventilation and stack effect) and renewable sources.<br>• Design and build to cut energy consumption to less than 50% of current usage. | • Building energy consumption can be cut in half with current technologies.<br>• North-south street orientation ideal for natural ventilation and cooling. Good cross-ventilation.<br>• Use of heat pumps. |
| **Building heights and massing** | • Several hundred units provide direct access to ground.<br>• Townhouses near school.<br>• Mid-rise 5- and 6-storey blocks near 1st Avenue at south end.<br>• Two 12-storey towers at southeast edge. | • Highrises to the east. 15% of total unit count<br>• Gradient from east to west. As a result, more families with children as you move west. | No radical height interruption.<br>Equal access to sun, views, open spaces.<br>Low rises of about 3 1/2 storeys; highrises of seven or eight storeys. |

Table 4:
Charrette Statistics

| **PARKLAND** | **Team 1** | **Team 2** | **Team 3** |
|---|---|---|---|
| Park (including paths) | 6.64 ha (15.95 ac) | 6.7 ha (16.57 ac) | 4.59 ha (11.35 ac) |
| Park (to shoreline) | 4.11 ha (10.16 ac) | 6.7 ha (16.57 ac) | 3.99 ha (9.85 ac) |
| Water area | 1.02 ha (2.51 ac) | 0.85 ha (2.10 ac) | 0.55 ha (1.35 ac) |
| Total Park | 5.13 ha (12.67 ac) | 7.56 ha (18.67 ac) | 4.53 ha (11.20 ac) |
| **FLOOR AREA** | | | |
| 2 storey | | 16,909 m$^2$ (182,010 sq. ft.) | |
| 2.5 storey | | | 5,091 m$^2$ (54,800 sq. ft.) |
| 3 storey | | 6,225 m$^2$ | |
| | | (67,011 sq. ft.) | |
| 3.5 storey | | | 91,962 m$^2$ |
| | | | (989,902 sq. ft.) |
| 4 storey townhouse | 24,950 m$^2$ | | |
| | (268,568 sq. ft.) | | |
| 4 storey | 27,052 m$^2$ | 60,996 m$^2$ | |
| | (291,200 sq. ft.) | (656,576 sq. ft.) | |
| 6 storey | | 79,464 m$^2$ | |
| | | (855,373 sq. ft.) | |
| 6.5 storey | | 204,687 m$^2$ | |
| | | (2,203,305 sq. ft.) | |
| 7 storey | 206,733 m$^2$ | | |
| | (2,225,328 sq. ft.) | | |
| 8 storey | | 51,991 m$^2$ | |
| | | (559,640 sq. ft.) | |
| 10 storey | | 52,567 m$^2$ | |
| | | (565,840 sq. ft.) | |
| 13 storey | 20,857 m$^2$ | | |
| | (224,510 sq. ft.) | | |
| 20 storey (on BC Transit site) | 19,472 m$^2$<br>(209,600 sq. ft.) | | |
| 30 storey (on BC Transit site) | | 58,527 m$^2$<br>(630,000 sq. ft.) | |
| 33 storey (on BC Transit site) | | 21,460 m$^2$<br>(231,000 sq. ft.) | |
| **Total** | **299,064 m$^2$<br>(3,219,206 sq. ft.)** | **348,138 m$^2$<br>(3,747,450 sq. ft.)** | **301740 m$^2$<br>(3,248,007sq. ft.)** |

Note:
Summary provided post-charrette by Stanley Kwok Consultants, for the City of Vancouver, December 15, 1998.

# 4. CONCLUSION

What emerged from the charrette was impressive. Despite the challenges of time and task complexity, and variations in approach, each team's commitment to the guiding principles of sustainability was imparted in the designs. Differences fulfill the charrette's goal of providing various design options. Commonalities demonstrate a shared vision and emphasize critical elements of a sustainable community; predominant common themes are probably best captured by the following key ideas.

## Incrementalism/Phased Development

It is important to provide opportunities for a "community" to evolve in more serendipitous and organic ways, take advantage of evolving technologies, reduce/distribute initial capital investments, achieve some learning gains, and further explore benefits and challenges of certain kinds of approaches.

## Flexibility, Adaptability

Particularly in the built form, flexibility and adaptability are key to ensuring that structures can be used or adapted, now or in the future, to serve different purposes (e.g., converting parking structures to workshops).

## Ecological Infrastructure or Working Green

It is important to make visible, support and work in concert with natural systems to provide and treat water, for energy and for waste handling and treatment. (This also creates education and on-site job opportunities.)

## Multi-Functionality

Ensure that design elements serve multiple functions (e.g., street as stream, park and green space as habitat and part of ecological infrastructure, school as a community activity centre).

## Organizational Comments

SEFC charrette organizers and participants (and some non-participants) had key recommendations to assist in organizing future charrettes.

### Time was short

The scope of work this charrette covered is more typical of charrettes of four or five days. The extra time allows for more detail and for production of a more comprehensive range of graphics. In this charrette, one participant from each team took that team's work back to his or her own firm and completed final presentation drawings. The city compensated that firm for its work.

However, it would have been ideal had those final drawings—and all the small decisions made during their completion—been addressed within the team context in the charrette. The completion of presentation drawings as part of the charrette also allows a more public final presentation to be held.

### Clearer directions

Many participants expressed concern that some of the policies, targets and indicators needed better definitions. For instance, many were uncertain what the term "habitat value" actually meant. Some were also uncertain about what the City considered to be "renewable energy." Questions such as these have prompted a more thorough clarification of many terms in the policy statement. A glossary was suggested and thus appended to this report by CMHC.

### Better communications

The charrette would have benefited from a better communications plan. Other stakeholders in the SEFC planning process expressed frustration at not being informed early on about the charrette and not knowing why they weren't asked to participate. Better preparation for dealing with media interest would have been useful as well. The graphics from the charrette are valuable for media coverage, and a media kit on results from the charrette would have been productive.

### Interaction with resource team

The resource team occupied a room adjacent to the main workroom where all three design teams were working. As a result, those running the charrette did not have as much interaction with the resource team as they would have liked.

The resource team engaged in extensive discussion on a lot of issues. With more interaction with the charrette facilitators, more of the discussion could have been recorded for future use. That being said, the resource team contributed greatly to the charrette. Much of its work was incorporated into the design teams' proposals. This included the idea of cluster utilities being actively used by two of the teams and all the teams addressing the heritage issues.

## The SEFC Charrette Legacy

The long-term implications of the charrette recommendations are also worth capturing. If pursued, certain recommendations offer opportunities to transform organizational decision making in ways that may result in more effective contributions to the development of sustainable communities. For example, one team recommended that the City of Vancouver Parks Branch include the promotion of ecological infrastructure within its mandate and incorporate such spaces within its area of responsibility. This notion has some significant implications. While broadening the responsibility base, it also suggests bridging traditional departmental lines and developing a more cooperative and collaborative working relationship between Parks, Planning and Engineering. Pursuit of such an initiative will call for transformation of existing lines of communication and the culture of the organization as a whole; such transformation may be an important step toward the creation and maintenance of a sustainable community.

In conclusion, the charrette participants sought to design a place that could generate and preserve on-site resources, serve social needs and be economically feasible. Swales, marshes, indigenous plants; multi-purpose centres and community gathering places; finer grain designs to encourage and improve walkability; buildings that receive sun and breezes; harvesting water and energy (perhaps even food) by being more cognizant of, responsive to and synchronous with, the natural world—these are some of the elements of sustainable design illustrated in the charrette. They speak not only to enhanced self-sufficiency but also to a greater sense of the internal and extended community and a richer quality of life. In so doing, the charrette goals and objectives were not only well met but exceeded.

It is hoped that further exploration of the ideas and key themes of the charrette will continue to inform the development of Southeast False Creek as a sustainable community and extend opportunities for learning and change to the larger community. There are indications that this is being fulfilled. The charrette design ideas and recommendations are apparently influencing city staff's thinking and planning, and many are being adapted and incorporated into the development consultant's work. The ideas are also extending into the larger community in various ways. For example, a Toronto group used the framework document as a basis for a community workshop on the city's bid for the summer Olympics. SEFC documents were also consulted during the sustainable planning process for a 486 hectare (1,200 acre) development in Massachusetts. It appears that the SEFC charrette has provided many seeds for ideas and change and that many of these are already growing. Within the spirit of sustainability, this may well be the most poignant measure of the charrette's success.

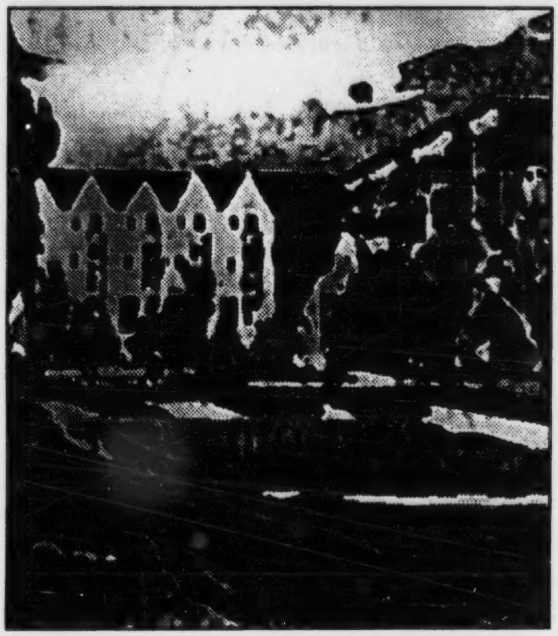
# PART II SEFC DESIGN CHARRETTE TEAM REPORTS

## 5. TEAM 1

Team 1 made the following key urban design and planning decisions that influenced the final plan in important ways.

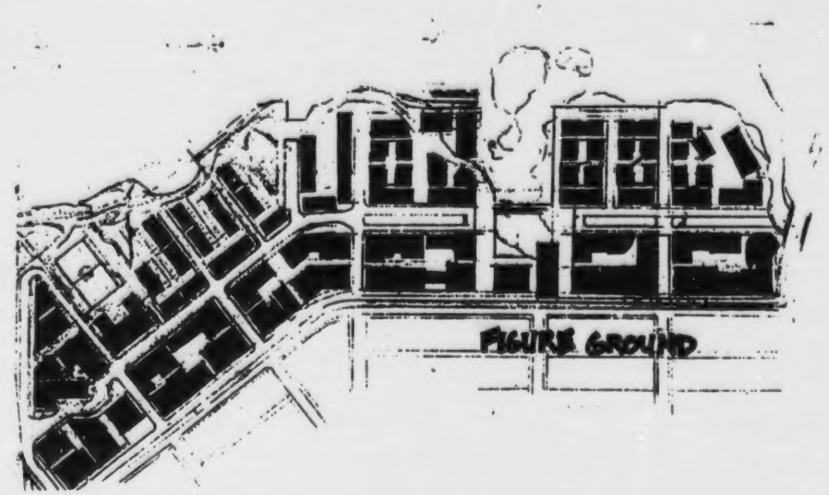
- The traditional Vancouver block is respected. Off-site streets are extended into the site. New east-west avenues are created.

**Figure 5.1**



- Density targets would be met, but the design stresses low-rise structures.
- All public planted areas serve a bio-remediation and habitat function. For example, each double row of rowhouses incorporates a graywater system as part of the rear yard area. A "hedge" of reeds in a remediation bed separates the private backyards from the pedestrian lane.
- A new seawall design prototype is introduced where bio-remediation and habitat areas are threaded together by bicycle and pedestrian paths in a continuous and dramatic composition.
- All streets on the site allow stormwater to infiltrate and provide healthy situations for street trees.
- All streets allow on-street parking. Over one half of required parking is accommodated in this way. Additional parking for residential streets is provided underground in buildings fronting 1st Avenue, less than 100 metres from homes.
- A commercial and civic centre is created surrounding the Domtar Building. The water from False Creek is drawn back into the site at this point.
- No parcel is greater than 0.4 hectares (one acre). Larger building are compositions of various ownerships. This allows more flexibility, more participation by more architects, smaller builders and developers.
- The Crystal Palace situated beside the Domtar Building would function as a conservatory, treating blackwater from up to 25 per cent of the buildings on the site.
- Brewery Creek is day lighted at the east end of the site. A rich intertidal zone would gradually develop at the point where Brewery Creek meets False Creek.

**Figure 5.2**



## Description of Team Process

Because of different perceptions and priorities, discussions were often animated. Areas where creative interchanges occurred included the following.

- Where should we locate public space and how much should be supplied?
- What functions were appropriate over toxic soils (more information would be needed)?
- How enthusiastically should multi-unit buildings approach the street (i.e., how much setback, if any, was really necessary)?
- What was the role of the automobile on site?
- How many of the consequences of habitation could the site reasonably expect to absorb (bio-remediate)?
- To what extent were sustainability issues important in and of themselves and, conversely, to what extent were they important as demonstrations to a wider audience outside the community?

We decided that if the SEFC was to tout itself as "sustainable," then it should do so. No half measures. Either make it a demonstration area of significance to the whole of North America, or call the whole thing off and proceed more or less in conformance with the more traditional urban planning objectives that have produced good, if not truly path-breaking, results in other parts of the city.

## Description of Design

### Rainwater

One hundred per cent of the rainwater and graywater on the site are captured in specially designed reed beds leading to a network of linked treatment marshes adjoining the seawall area. Graywater is pre-treated before entering this system. At selected sites in the open space system, detention areas accommodate high-flow events. At four locations, spiral screens remove solids. (These structures are sited in visible locations and interpreted to help residents and visitors understand how the community's stormwater is managed.) Remaining nutrients and pollutants are cleaned by the treatment marshes before drainage into False Creek.

**Figure 5.3**

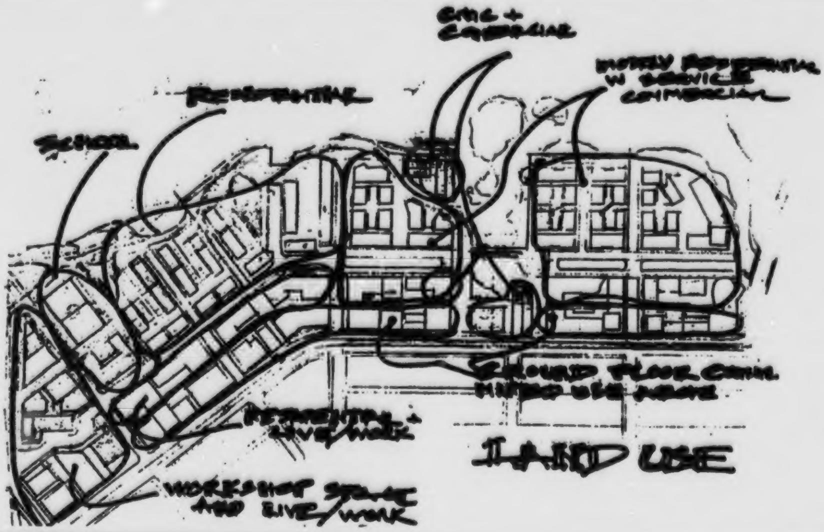

CIVIC +
COMMERCIAL
MOSTLY RESIDENTIAL
W SERVICE
COMMERCIAL
RESIDENTIAL
SCHOOL
GROUND FLOOR COMM.
MIXED USE AREAS
RESIDENTIAL +
LIVE/WORK
LAND USE
WORKSHOP SPACE
AND LIVE/WORK

**Figure 5.4**

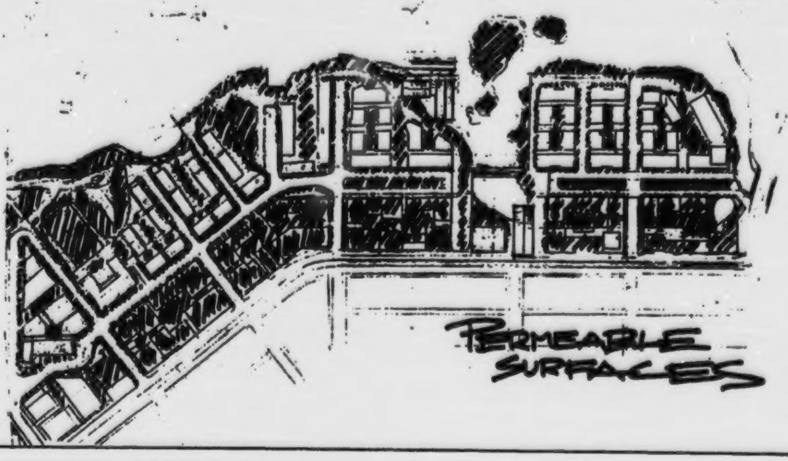
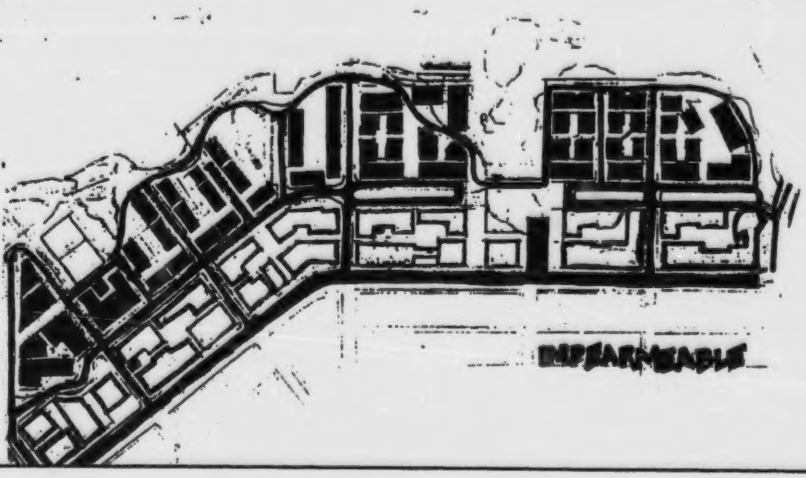

PERMEABLE
SURFACES

**Figure 5.5**


IMPERMEABLE

### Working open space

The 17+ acres of reserved public space achieve the city's standard of 1.11 hectares (2.75 acres)/ 1,000 population, and more than 60 per cent of the open space provides habitat value. As noted above, streets and lanes function as part of the site's circulation, drainage and open space systems.

A hierarchy of roof gardens, courtyards, parks and re-created natural areas provide recreational access and benefits for each block and the larger community. A publicly accessible waterfront and a new heritage trail extend the entire length of the community providing ecological and recreational benefits for the whole city. The drainage system provides a framework for linked internal open spaces. These areas are planted with indigenous plant species, providing habitat for plants, insects, amphibians and songbirds. The treatment marshes located near the seawall provide new nesting and feeding areas for waterfowl. Community gardens provide fruits and vegetables to community residents and connect residents with each other and the soil. Extensive planting of fruit and nut trees and the use of fruit-bearing plants as ground covers and hedges make the entire community an "edible landscape."

The uncovered and restored outfalls of Brewery and China creeks run through the new constructed wetland at the west end of the site. The success of these restoration efforts will demonstrate the potential to re-establish urban natural systems in densely developed areas throughout the city, particularly in the vast derelict rail yard district immediately to the east of False Creek.

### Soil

All the projects ecosystem restoration efforts and drainage systems are constructed above contaminated soils that are capped and contained by an impervious layer. Approximately one metre of new fill tops this layer.

### Public green

Green spaces reach into every portion of the community, and link every district with the seawall which has been redesigned as a "softer," more natural edge providing habitats more hospitable to a range of species. Sea birds and seals find suitable and safe habitat on the new islands created at the centre of the project. The existing slip is enlarged into an inlet extending south across the site, creating a central public space for community residents and visitors. At its southern end, this inlet becomes a created freshwater wetland, bringing the water's edge back to its historic shoreline just north of 1st Avenue. The historic Domtar Building becomes a community centre, providing the focal point for the neighbourhood's social life and, once again, extending on pilings out across the water as it did when first built.

**Figure 5.6**

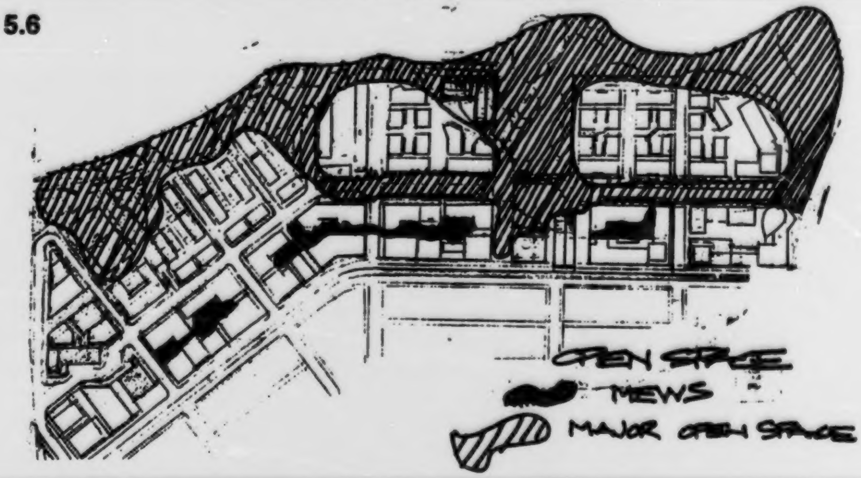


**Figure 5.7**

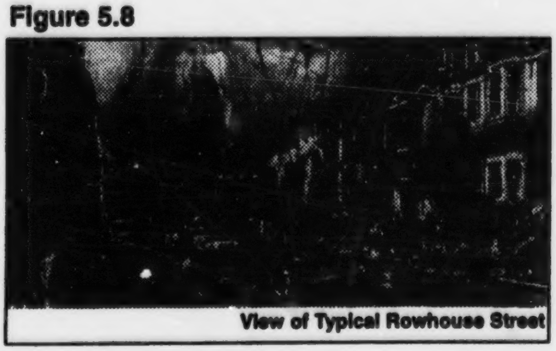
View of Central Bio-Remediation Green

### Built structures

Increasingly, Vancouverites are choosing to integrate their work and family lives by moving into live-work situations which eliminate costly, time-consuming and polluting commutes and provide a range of secondary benefits to the city. Live-work situations are also supportive of start-up businesses, making this entire development a virtual incubator for new industries that will form the core of the city's future economy.

For these reasons, this community has been designed to accommodate a broad range of live-work and loft spaces located throughout the buildings on 1st Avenue and the structures facing the inlet. It is anticipated that a dynamic mix of retail, services and workshop activities will occupy these spaces. High ceilings, ground access to the streets and visibility from 1st Avenue encourage live-work. In the rowhouse neighbourhoods, live-work is encouraged by the flexible nature of these structures, the high ceilings and direct access from many units directly to public streets and courtyards.

**Figure 5.8**



View of Typical Rowhouse Street

### Residences

This community is designed for a population of between 5,000 and 7,000 residents in 3,000 housing units that should be attractive to every income and age group, and household type. It is expected that the four-storey townhouse district in the western end will be especially attractive to families with children and owner-occupants. In this area, each townhouse has direct access to a private garden, and the whole area is near the new elementary school. A young family could, for example, use the ground floor for an office, workshop or studio, while renting out another floor to an empty nester or young couple. As the family grows, it could expand into this former rental space or work area. The potential for these units as live-work spaces could allow a parent to stay at home with young children, while remaining actively involved in a career or craft. The elderly, empty nesters and young families and individuals can choose among a range of apartment and loft buildings, all convenient to on-site stores and services and streetcar service.

### Parking

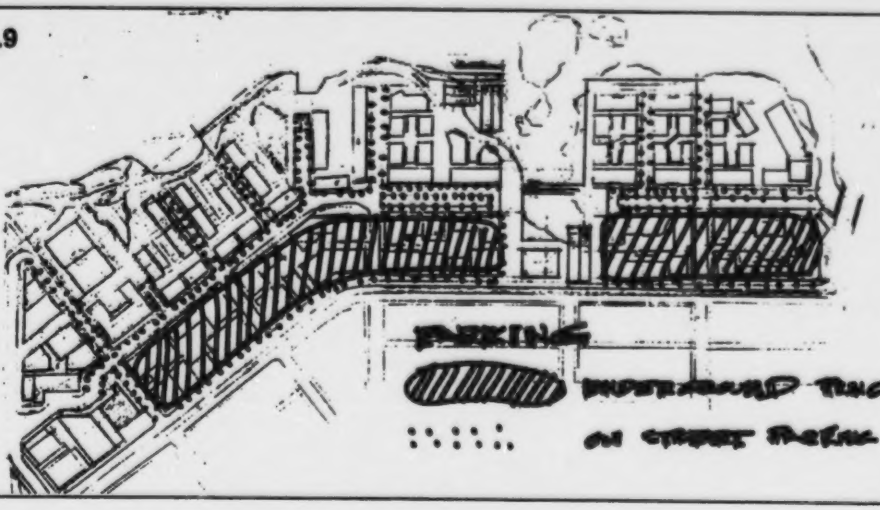
This community plan provides one parking space per unit, although it is anticipated that many residents will choose not to own a car. Over half the parking is provided in underground garages located beneath the mixed-use buildings along 1st Avenue. In addition, on-street parallel parking is provided on residential streets throughout the development, on top of crushed stone infiltration trenches that carry stormwater north toward the linked treatment marshes.

### Commercial life

This community has been designed to provide all the daily retail and service needs of its residents in 9,290 m$^2$ (100,000 sq. ft.) of commercial space, to reduce the need for automobiles and to increase the self-reliance and identity of the whole community. It is anticipated that many of the proprietors and employees in these retail establishments will choose to live in the community, further reducing traffic and congestion.

Retail and service activities are concentrated in ground-floor space along the 1st Avenue frontage

Figure 5.9



where they are also accessible to residents of nearby neighbourhoods and streetcar and automobile commuters, making them more sustainable.

### Offices

The plan includes 2,323 m² (25,000 sq. ft.) of neighbourhood office space, primarily in ground- and second-floor levels in the blocks facing 1st Avenue. Additional office space will be available on ground floors of buildings facing the inlet and off courtyards in the larger blocks at the eastern end of the community.

### Industry

The plan provides for 6,968 m² (75,000 sq. ft.) of workshop space. As noted above, additional office and workshop activities can be accommodated in live-work settings throughout the neighbourhood. The plan proposes to integrate industrial and workshop activities into mixed-use buildings and, hence, into the life of the community. Children can grow up in a place where people work and produce goods and services as well as live, providing them with greater perspective on the role of work in life.

### School

The 3,252 m² (35,000 sq. ft.) school, located in a free-standing structure near the western edge of the site, provides a focal point for civic life at this end of the community, which contains the largest concentration of rowhouse streets—anticipated as housing for families with children. The adjoining schoolyard/play field also provides an amenity to residents of the whole community. With direct visual access across the play field to False Creek and downtown Vancouver, the school orients students to the larger community. The school will function as a community school, with recreational, classroom and other facilities available to the public in non-classroom hours. The school play field also adjoins one of the community's treatment marshes, providing students with the opportunity to gain first-hand knowledge of the environmental systems of their community.

### Community centre

The community centre is in two structures: the preserved historic Domtar Building and a new boathouse/multi-purpose centre on the waterfront. Both structures accommodate a range of community activities, and are adaptable to changing needs. The Domtar Building functions as the "town hall" and nerve centre of the community's life and economy. A small group of professional, administrative and maintenance workers manage community facilities, including the community composting, wastewater treatment and landscape maintenance programs. Community volunteers work with the staff to provide most of the effort needed to operate these services. For example, residents are responsible for tree and landscape maintenance on their own blocks, with support from a professional arborist. The Domtar Centre provides space for community meetings as well as dedicated areas for health and exercise programs. Community groups serving the needs of children, adults and the elderly would have flexible space for their programs.

The boathouse is expected to provide similar space, in addition to its central role as a place where individuals and the community could keep small rowboats, kayaks and sailboats. A community boating facility could provide access to the restored waters of False Creek. Instruction in sailing, crew and kayaking classes could give residents of all ages the skills needed to make boating safe, fun and inviting. Races and other competitions could provide a focal point for civic celebrations.

**Figure 5.10**

View of Community Boat House

A third community space is the Crystal Palace solar aquatic greenhouse facility, which treats one quarter of the gray- and blackwater generated in the community. Located near 1st Avenue at the head of the inlet, this highly visible and elegant structure celebrates the community's commitment to treating its own waste.

### Day care

The day care centre is located in ground-floor space in a live-work building overlooking the inlet, the central public space of the community. By siting this facility in this conspicuous and active location, it becomes a vital part of the life of the community. A secure outdoor play space adjacent to the day care, provides kids with safe access to the outdoors in good weather. The centre adjoins the Domtar Building/Community Centre and boathouse, and the activities there can become a part of the life of youngsters enrolled in the day care. The inlet's fresh and saltwater wetlands, and their bio-remediation function, give kids the opportunity to learn about their place in the environment of their community and the larger world.

### Street design

The street design makes the car secondary to the circulation needs of pedestrians and cyclists, since the automobile will play a small and declining role in the life of the community and its residents. Automobile use is controlled by providing the minimum necessary roadway widths and incorporating traffic-calming measures. Interior streets discourage through traffic, and "eyes on the street" make them safe for children's play and create social spaces that contribute to a sense of community.

**Figure 5.11**

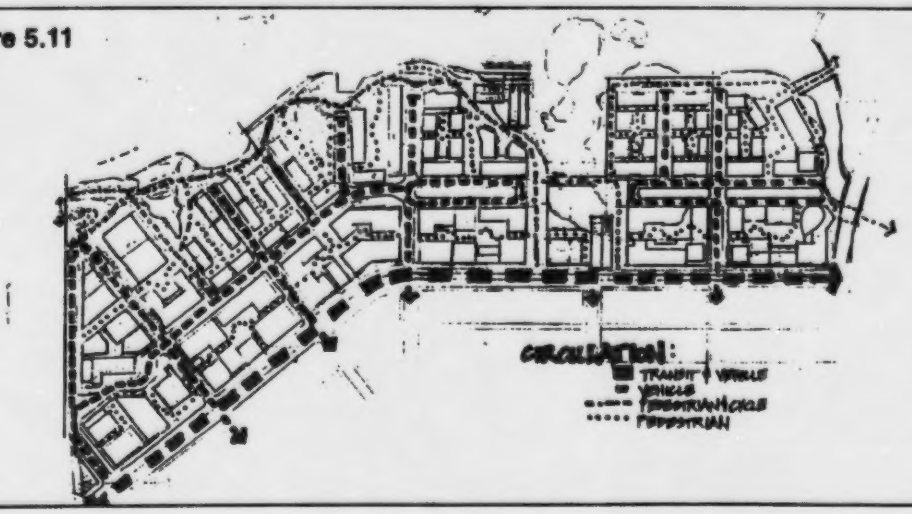


**Figure 5.12**

View of First Avenue High Street

### High street

1st Avenue, along the south boundary of the site, is the commercial heart of the community. Retail stores, services and workshop spaces animate the life of the street and serve automobile and streetcar commuters. The Domtar Building/ Community Centre and nearby Crystal Palace solar aquatic greenhouse provide additional destinations for community residents and visitors.

### Streetcar

The streetcar is routed along 1st Avenue, to make the community's commercial corridor accessible to the larger neighbourhood, and to animate the corridor's streets. Expected improvements in streetcar service will also reduce the need for automobile use by residents.

### Sustainable streets

The streets and on-street parking areas are designed to manage and treat stormwater drainage. Paved streets direct stormwater to on-street parallel parking areas built on top of crushed stone infiltration trenches that carry stormwater toward the linked treatment marshes.

### Parcel size

The community has been designed to be subdivided into several hundred parcels to encourage fine-grain development and the diversity and serendipity it can bring to the project.

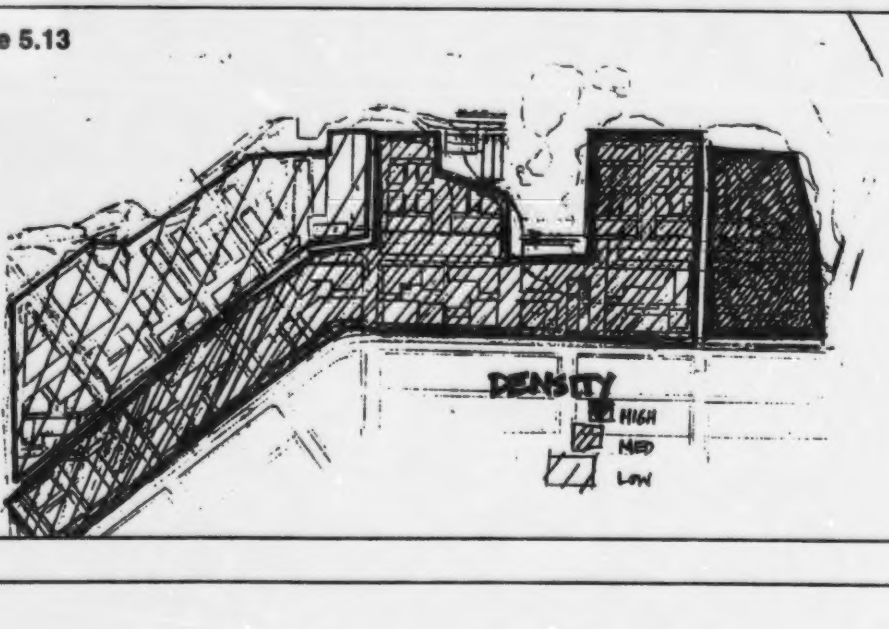
### Building energy performance

All buildings are sited to maximize solar gain and reduce shading of public and common spaces. A broad range of building types and the large number of building parcels permit the widest possible experimentation in design and construction techniques to cut energy consumption.

### Building heights and massing

Several hundred residential units have been designed to provide direct access to the ground as an attraction to families with children. Four-storey townhouses provide gardens and ground access near the community elementary school. In other parts of the community, ground-floor units have direct access to streets and courtyards. Mid-rise five- and six-storey blocks are located at the

**Figure 5.13**



southern edge of the site facing 1st Avenue. Two 12-story highrises at the southeast corner of the site provide views and the social distance desired by older and wealthier households.

## Discussion of Technical Issues

### Water and waste management

The overall approach to sustainability of water and waste management is simple: reduce, re-use, recycle. Even though Vancouver has high water availability, it is nearing capacity of current water storage. While new dams are possible, they are not preferable in a sustainable world where the focus is on sufficiency instead of excess. Within these basic premises, we have some other aims. The system should:

- be functional;
- challenge current paradigms, but retain a high degree of livability;
- "walk the sustainability talk"; and
- meet multiple objectives (part of sustainability).

### Separate streams

In dealing with the water/liquid waste streams on site, we started with the principle of not mixing "unlike" streams. That means keeping blackwater, graywater and stormwater separate for treatment, and then combining the treated streams when appropriate for optimal re-use.

### Graywater

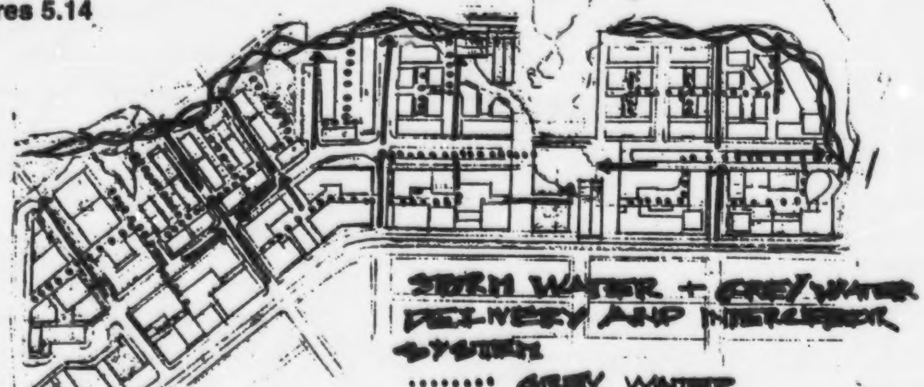
Our design treats all graywater on site. Because we are mandating water-saving appliances (tap fixtures, washing machines, etc), the concentration of contaminants is relatively high for graywater (e.g., biological oxygen demand or BOD around 250 to 300mg/L, suspended solids around 150 to 200 mg/L). Different treatment options are therefore necessary.

Seventy-five per cent of graywater is treated by passing through a septic tank, achieving suspended solids removal and some BOD removal, as well as dampening the variance in flow. The septic effluent then flows to subsurface flow wetlands, also known as reed beds. Many local species can be used here (e.g., Phragmites, Scirpus, Typha). The reed beds provide a visual public amenity, increasing potential educational benefits and bringing wastewater treatment to the fore. Some treated graywater is then recycled for toilet flushing. A small volume is ozone disinfected and recycled for edible garden (local and community) watering.

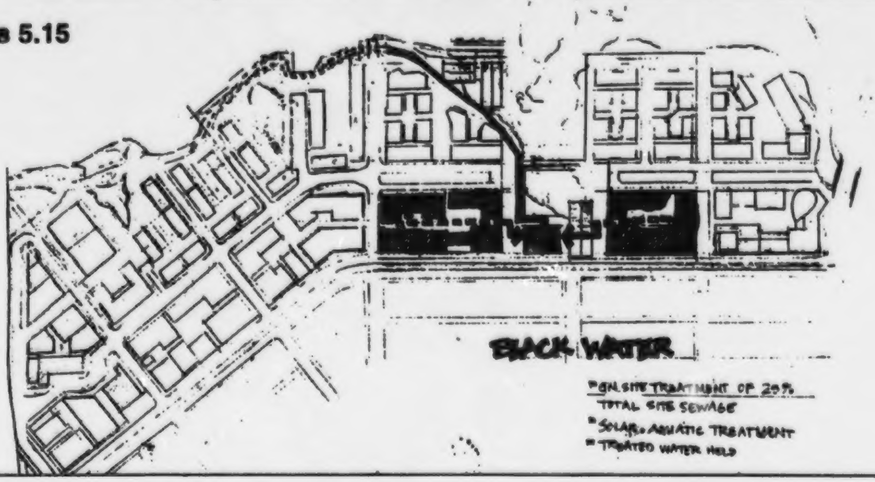
### The Crystal Palace

The remaining 25 per cent of graywater is combined with 25 per cent of the blackwater and treated in the Crystal Palace—a glass conservatory-like structure. The palace is a celebration of natural treatment systems for wastewater so it is located right in the commercial

**Figures 5.14**



**Figures 5.15**


BLACK WATER
* ON SITE TREATMENT OF 25% TOTAL SITE SEWAGE
* SOLAR AQUATIC TREATMENT
* TREATED WATER HELD

and community heart of the development. This dramatically increases the educational benefits of a wastewater treatment system. Our aim is to help people realize the terrific resource value in wastewater and to demystify the process of treating wastewater.

Treated graywater and the effluent from the Crystal Palace are fed to shoreline freshwater wetlands. The multiple objectives here include habitat creation, storage for irrigation to landscaping and open space areas, public amenity and education, since these are laced around the boardwalk on the shoreline. The wetlands overflow to False Creek.

### Other sewage systems

Owners of rowhouses will have the option of composting toilets, for direct recycling of the nutrients.

Remaining blackwater (65 to 75 per cent) is sent to mains. However, we are mandating very low volume dual flush toilets (3L/6L), as currently used in Scandinavia. This requires smaller diameter piping in order to keep velocities higher to ensure solids do not settle.

Overall, this results in on-site treatment of more than 80 per cent of the hydraulic load, and more than 60 per cent of the contaminant load.

### Stormwater

Stormwater is also treated entirely on site. Infiltration systems of pretreating swales, then gravel-filled ditches and spiral swirls, as appropriate for higher-flow areas, move the partially treated stormwater to the shoreline wetlands and the treatment basin adjacent to the boat shed. Here, low-flow/high-flow devices retain the stormwater for up to a couple of days, before release to False Creek.

### Overall performance

The system described above meets all of our objectives.

- Functional: All on-site effluent is at least secondary effluent standard before public contact is possible.
- Challenging: The system manages all the liquid waste entirely on site through technologies which, although well-tested and in use around the world, are not necessarily familiar to Canadians. However, we believe it will be accepted as the technologies do not produce odour and the facilities are pleasant to use, thereby, challenging alternatives to the current "flush and forget" syndrome.
- Sustainable: No external energy is required for treatment. Natural processes of biodegradation are the heart of the system.

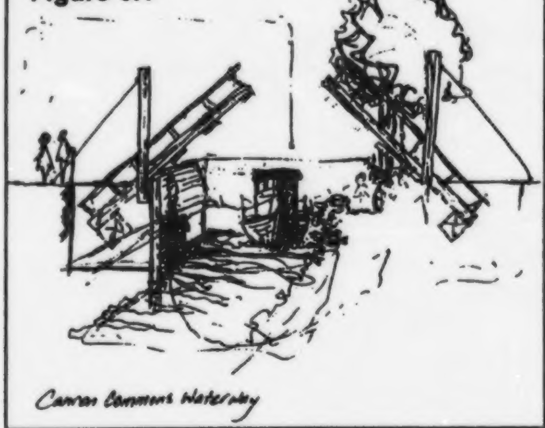
No additional chemicals are necessary and no chemical sludges are generated. Some energy is necessary for re-use (e.g., ozone generation and disinfection, pumping for toilet flushing, pumping for irrigation). Distances between supply and use have been kept to a minimum, and the system is designed to be implemented incrementally.

- Multiple objectives: At every stage, the whole water and wastewater cycle is visible; residents and visitors develop an awareness of the resource at their disposal. Habitat creation is also an important component. Multiple use and re-use and recycling are built in to the system.

# 6. TEAM 2

Two powerful themes inform our project and merge in our concern for the making of discernable places: the search for a viable, sustainable public realm and the desire to reveal the unique facilities and difficulties latent in the site.

**Figure 6.1**



Six factors influenced our approach:

- accessibility to both pedestrian and car, of housing and retail/commercial areas;
- provision of a variety of housing solutions;
- creation of distinctive places and places for interaction;
- appropriate placement of building types and landmarks;
- provision of "binding" elements, recognizable as belonging to the area; and
- retention of the sense of the original place (the Domtar Building) and natural features.

## Description of Team Process

First, having established a list of values and principles, the team undertook an exercise of layering existing site constraints and opportunities, and city requirements with the systems of a sustainable community.

Values which were identified as important to shape our work included such concepts as change, regeneration, diversity, idiosyncrasy, flexibility, adaptability, beauty, memory, urbanity, collaboration, interconnection, understanding, eco and energy systems.

A site visit gave the team a feel for the place in the city. Elements included:

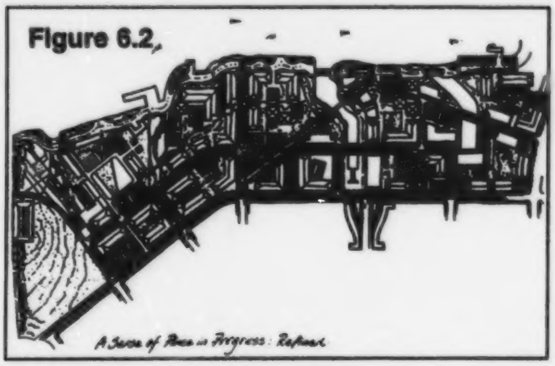
- views of Science World, the Lions, north side of False Creek and the Creek itself;
- the value of existing trees, though not indigenous, at water's edge;
- the flatness of the site;
- the value of the Domtar Building as a landmark;
- the existence of pilings and water under the Domtar Building indicative of original water line;
- the surrounding city fabric;
- dominant edges—Cambie Street Bridge, the Creek, City Gate and 1st Avenue;
- the realization that 1st Avenue is not a major thoroughfare, 2nd Avenue is; and
- the links to the south including Mount Pleasant and City Hall.

A draft model was built to illustrate the preferred concept plan. Though very conceptual and in a sense abstract, the plan and model give the community a sense of place, a texture in the context of the city, the density required by the program (3.2M. sq. ft.) and more open space than the program required.

The team met on the first day and very quickly established roles and objectives. After a review of the existing research (provided in part by the student members), we decided that a second visit to the site was needed.

We considered context, zoning and by-laws, generating features, such as views, heritage,

**Figure 6.2,**



A Sense of Place in Progress: Refined

pedestrian systems, existing fauna and flora, form of development (order and continuity), building livability and, particularly, human needs, noting:

- identity and clarity of layout;
- sun angles and shadows;
- amenity spaces for children to seniors;
- privacy and views;
- barrier-free access;
- weather protection;
- human scale, fabric texture and variety;
- planting—commercial and private;
- safe and defensible space; and
- building design (compatibility, desirability, forward thinking, roofscape, quality), street systems and the developments overall contribution to the City of Vancouver.

We further resolved together, to:

- help unite this place into the cohesive fabric of community, allowing action, creation, stillness and reflection—a community that is rich and real;
- fully use this opportunity to work with each other (different disciplines) and have fun doing so; and
- be inspirational, liberating and enabling, use consequences modelling and, above all, be accountable!

## Description of Design

The developed community is a system that contains a set of organizing structures of psychological significance to its inhabitants. We attempted to create inviting spaces close to home to offer a sense of mystery and promise. Enjoy the places for their visual appeal and utility as passageways within the site. We believe the development of supportive, enjoyable places for walking (and the public life that accompanies walking) is one of the crucial challenges for making a community sustainable. Therefore, we have emphasized creative pathways within the development.

A path is a route we follow whatever its visual, kinesthetic or psychological character, but paths are full of the deep mythological potential of seeking adventure and transformation. They provide the opportunity to engage in the spaces in between origin and destination, and the space between the edges of the path itself.

### Urban vision

We sought to reform design and planning in ways that converge on certain basic principles:

- a spatially coherent and cohesive sense of place, neighbourhood and community that builds on what is locally unique and enduring;
- a dense and compact clearly defined community;
- a rich and fine-grained mix of land uses, household and building types, and socioeconomic groups;
- walking, bicycling and public transit operating on an interconnected network of streets, alleys and paths that enhance mobility, connectivity, efficiency and health needs, and replace car use as much as possible;
- rekindling the public realm with face-to-face interaction in public places; and
- sustainable economic and cultural practices, traditions and mythologies working together with the lessening consumption of natural sources and resources.

**Figure 6.3**

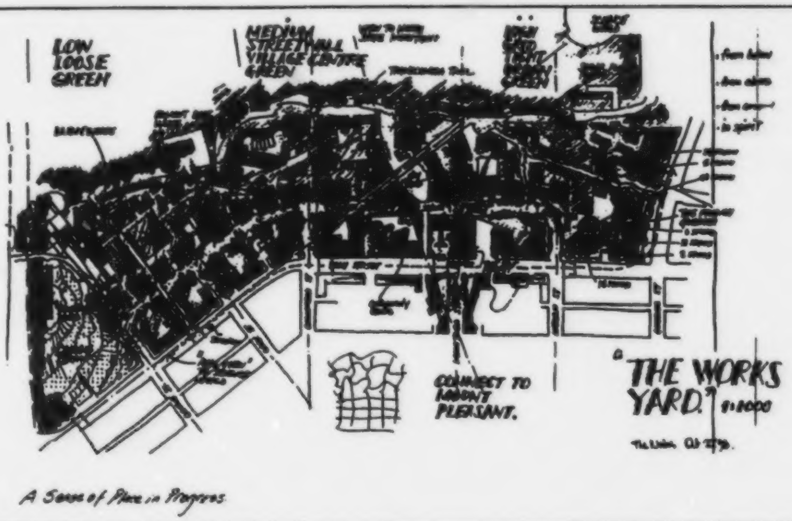
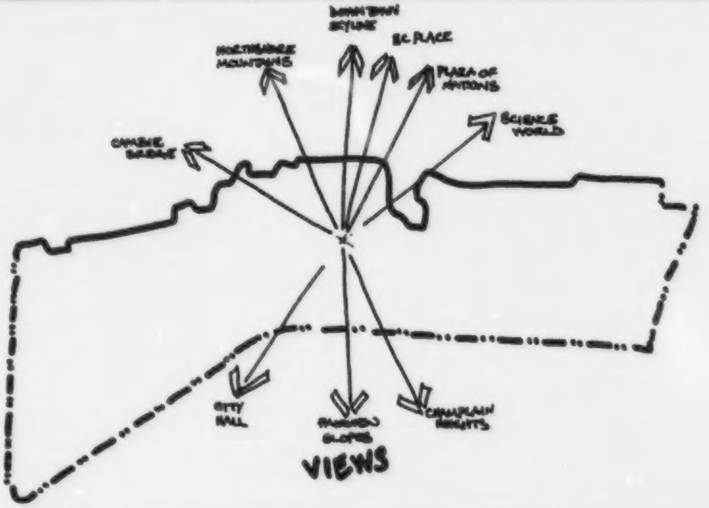

LOW
LOOSE
GREEN
MEDIUM
STREETWALL
VILLAGE CENTRE
GREEN
HIGH
GRID
TIGHT
URBAN
GREEN
CONNECT TO
MOUNT
PLEASANT.
"THE WORKS
YARD."
A Sense of Place in Progress

**Figure 6.4**


DOWNTOWN
SKYLINE
BC PLACE
NORTHSHORE
MOUNTAINS
PLAZA OF
NATIONS
SCIENCE
WORLD
CAMBIE
BRIDGE
CITY
HALL
FAIRVIEW
SLOPES
CHAMPLAIN
HEIGHTS
VIEWS

To accomplish this, nodes were created, using workable distances and time as criteria and the three defined areas for development. These were named from east to west: "Low Low Green," "Medium Streetwall," "Village Centre Green" and "High Grid Tight Urban Green."

**Rainwater**

Rooftop rainwater is captured and held for irrigation and re-use in toilets. A network of surface gutters bordering all circulation routes directs rainwater into three stormwater/graywater catchment lagoons which then percolate slowly through the earth to False Creek.

**Working open space**

The proposed plan exceeds the open space requirement with a variety of spaces all contributing to surface water treatment, providing green environments and encompassing production gardening (including a community market hall for produce sale or exchange). A variety of passive recreation areas offer informal active areas and quieter enclaves. They vary from urban to heavily landscaped. In several places, blackwater treatment lagoons have running water and a rich plant life.

**Figure 6.5**

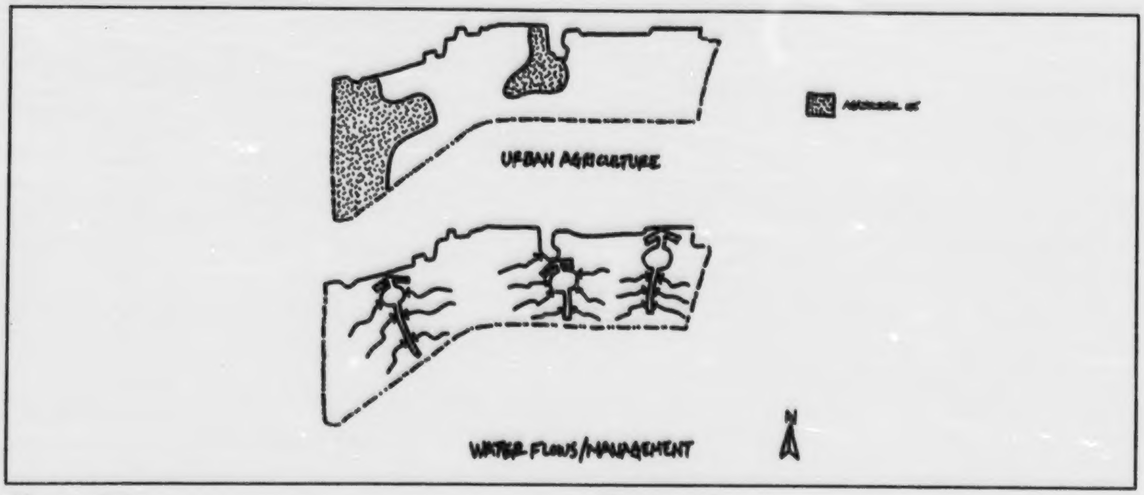
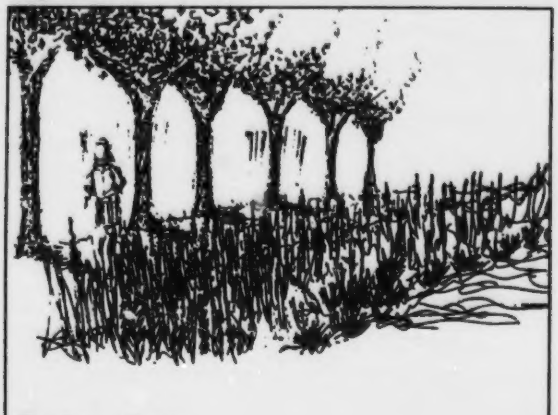

URBAN AGRICULTURE
WATER FLOWS/MANAGEMENT
N

**Figure 6.6**

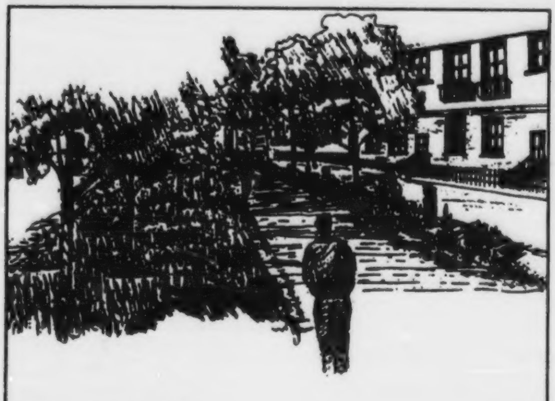


Drainage Swale

### Soil

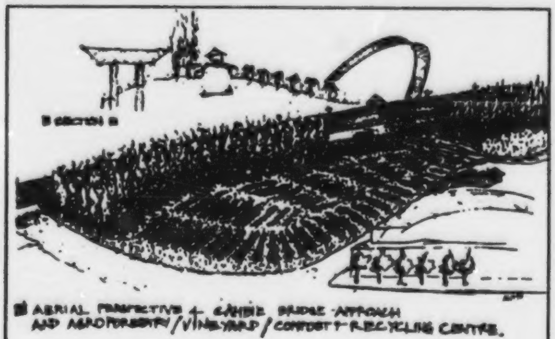
Major building, including underground work, can only take place realistically along 1st Avenue and Quebec Street. Soil conditions near the Cambie Street Bridge do not permit building or other disturbance. The plan assumes bio-remediation takes place only for hydrocarbons. A berm, sloping to the Cambie Street Bridge acts as a "capped" depository of heavy metal soils. This slope has solar access, assists in reducing bridge mass and provides access to park space.

**Figure 6.7**



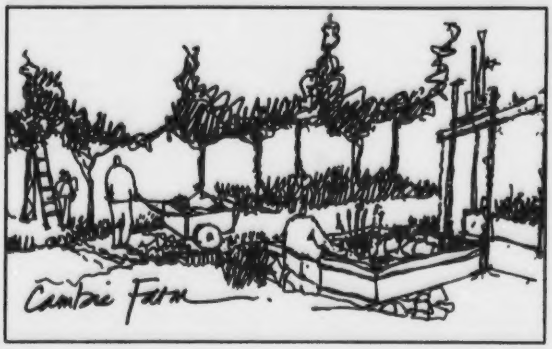
Waterfront Walkway

**Figure 6.8**


AERIAL PERSPECTIVE 4. CAMBIE BRIDGE APPROACH
AND AGROFORESTRY/VINEYARD/COMPOST RECYCLING CENTRE.

Cambie Farm

**Figure 6.9**



**Public green**

At every opportunity, green is brought up to buildings including pathways, roadways and swales. All rooftops are planted; most are accessible for gardening. South and east walls provide a face for vertical plant materials.

A variety of green walkways and car-tolerant access ways serve the area and link waterfront walkways and greenways. The seawall remains as is except for clean-up and repair. Existing waterfront trees are retained and maintained.

**Figure 6.10**

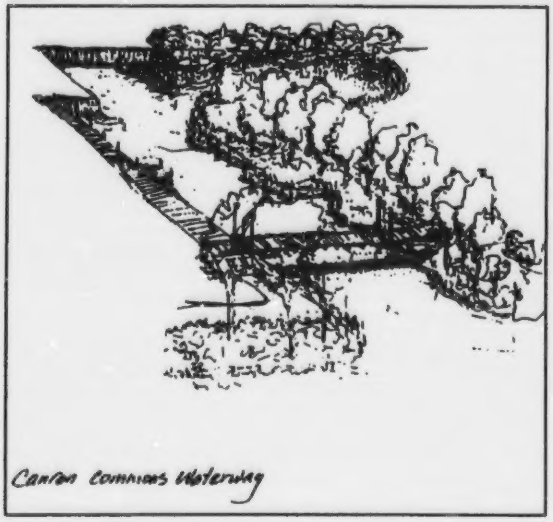
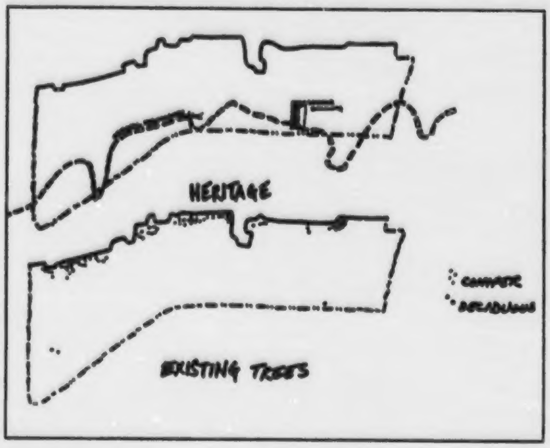


**Figure 6.11**



**Residences**

Planned residences accommodate a diversity of socioeconomic backgrounds and tenure types.

**Parking**

One space per unit is provided. A hierarchy of accessibility accommodates most parking along the north side of 1st Avenue. Here, the parking is mainly below grade where geotechnical conditions warrant. The spaces along 1st Avenue can be used in several other ways, in addition to parking, as demand changes over time. Some parking is curbside. Other smaller pockets are also provided in "car-tolerant" access ways.

**Commercial life**

Commercial activity is based on Manitoba Street and 1st Avenue along with commercial/office/ light industrial/live-work and residential uses. About 18,580 m$^2$ (200,000 sq. ft.) of commercial space is available, depending on the take-up for other uses.

**Offices**

Most of the 9,290 m$^2$ (100,000 sq. ft.) allotted for office uses is along 1st Avenue. However space is also possible in live-work arrangements throughout the site.

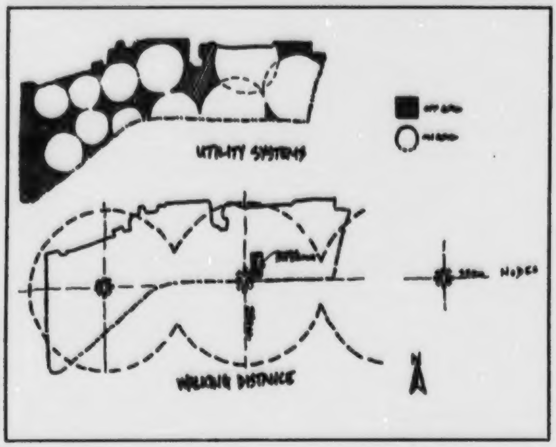
**Industry**

Most industrial space is along 1st Avenue. Small parcel sizes and a mixed designation allow for a variety of sizes of development.

**School**
The school is located at the central community focus (the Domtar Building) and is associated directly with the community centre as part of a mixed-use building.

**Community centre**
The centre of the plan is really the Domtar Building (the Salt Market) with the community buildings all within easy walking distance of residents. The community centre is part of this mixed-use facility. An urban square is also part of the configuration.

**Figure 6.12**


UTILITY SYSTEMS
WALKING DISTANCE
NODES

**Day care**
Three day cares are incorporated into mixed-use buildings to serve the three sub-districts and to be within easy walking distance, along pathways to the principal access routes.

**Street design**
Street connections exist to the south and along Manitoba Street, with an east-west connection along 1st Avenue by the proposed tramway, to the Quebec Street ALRT station. Urban grids on the site are recognized, but allowed to "unravel" creating an informal, free development process yet permitting appropriate parcelling for developer viability. A hierarchy of accessibility reduces vehicle access as one moves into the site and gives walking and biking the priority. 1st Avenue becomes a ribbon of retail/commercial, workshops with some residences above the commercial level and underground parking reducing the impact of cars on the site. "Boilermaker" a reminder of the past industrial nature of the area, is the only through road within the development.

**Streetcar**
The two central lanes of 1st Avenue provide streetcar access to the development. Sidewalks are widened and pedestrian surfaces occur at streetcar stops.

**Figure 6.13**

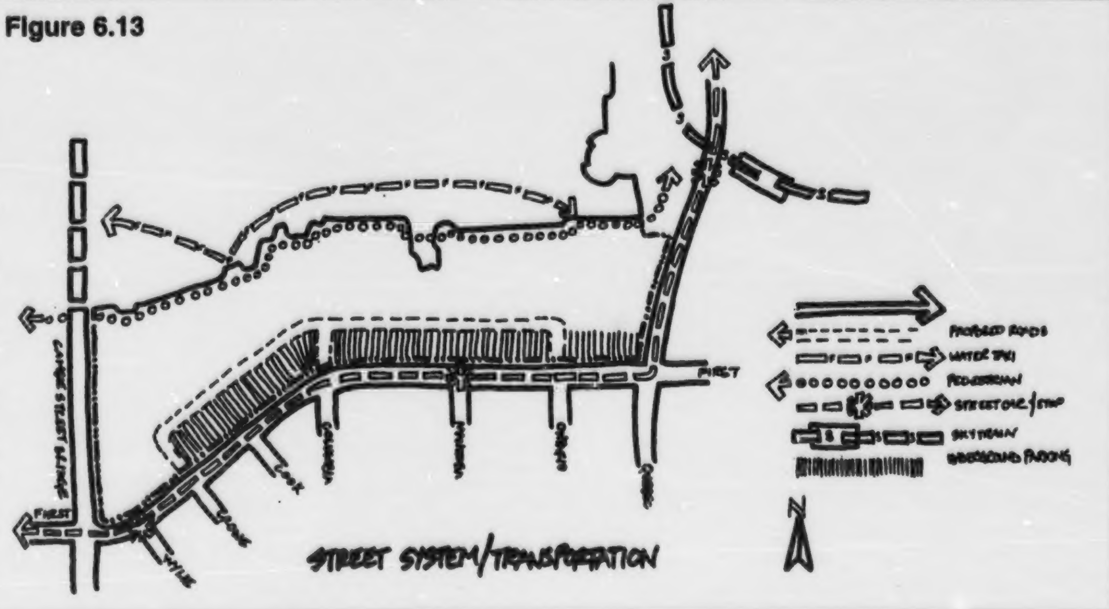
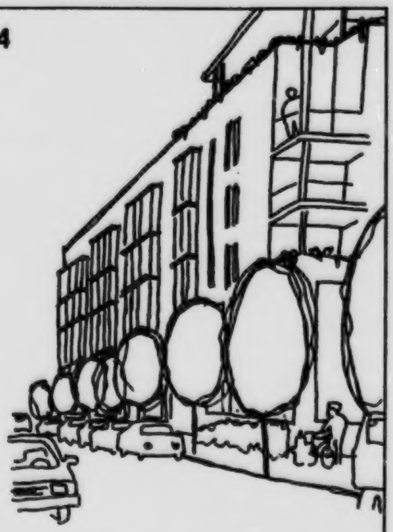
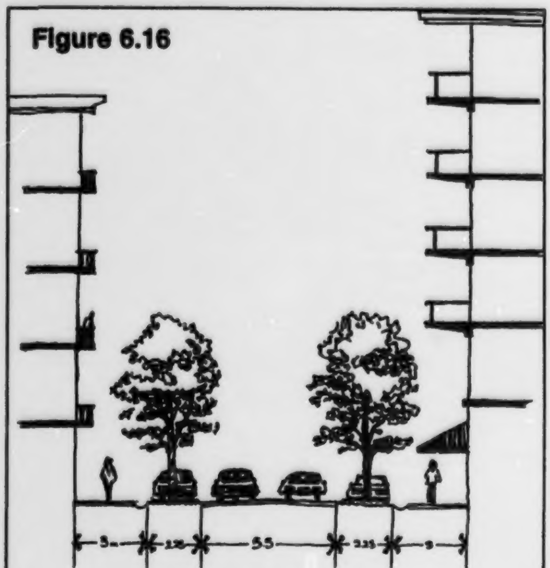

CAMBIE STREET BRIDGE
FIRST
FIRST
WYLIE
CROWE
COOK
COLUMBIA
MANITOBA
ONTARIO
QUEBEC
PROPOSED ROADS
WATER TAXI
PEDESTRIAN
STREETCAR/STOP
SKYTRAIN
UNDERGROUND PARKING
N
STREET SYSTEM/TRANSPORTATION

**Figure 6.14**



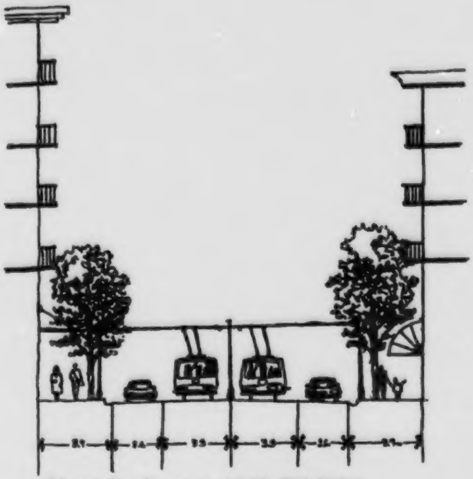
First Ave Frontage

**Figure 6.16**



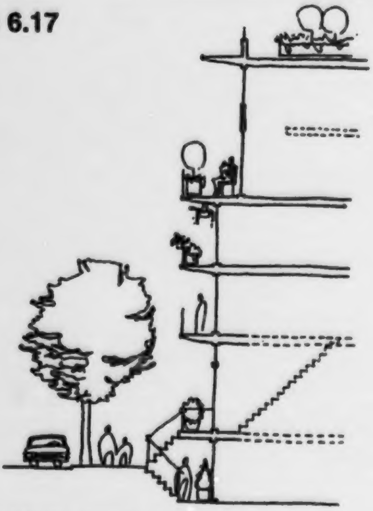
Street Sections: Boiler Maker

**Figure 6.15**



Street Sections: 1st AVENUE CROSS-SECTION

**Figure 6.17**



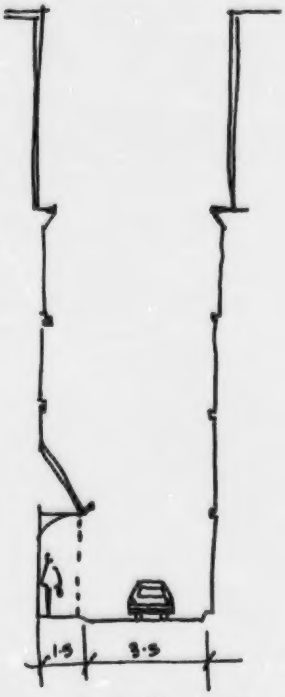
Street Section thru Green Building

**Sustainable streets**
All internal streets have surface water gutters that flow into catchment lagoons. Streets are planted with a variety of trees and other landscaping materials.

**Parcel size**
A variety of parcel sizes and types are provided, most involving party walls. About 30 parcels are indicated but this can be increased. More work is required in this area.

**Building heights and massing**
The plan offers a gradient of building heights from east to west with a few highrise towers in the east. As a result, as you move west across the site, the number of families increases as residences with direct ground access increase. The highrise component houses about 15 per cent of the total unit count.

**Figure 6.18**



car tolerant alleyway access.

**Figure 6.19**

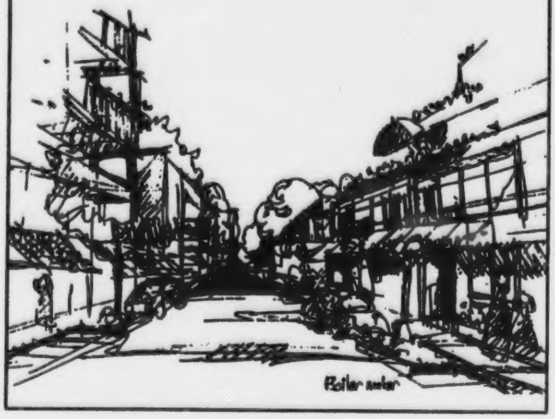
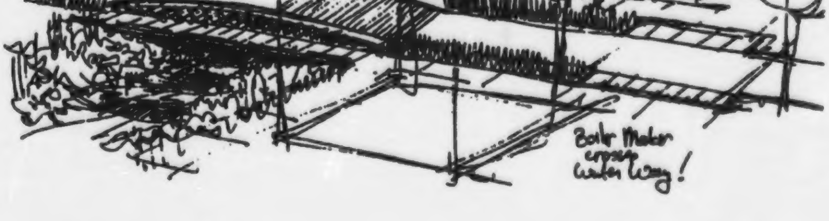

Boiler maker

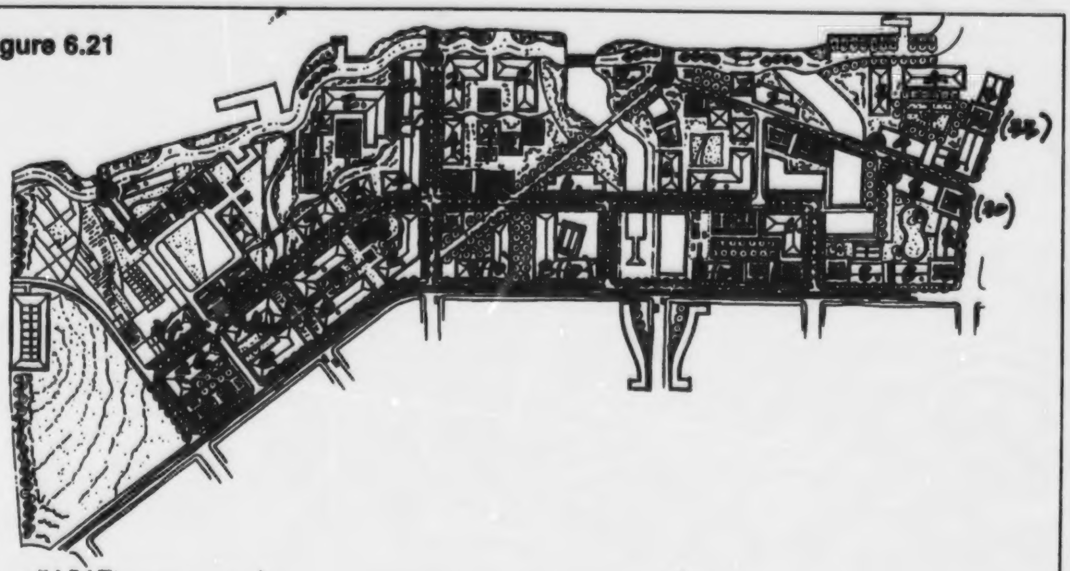
**Figure 6.20**



Boiler Maker crosses water way!

Boiler Maker

**Figure 6.21**



Drafting a Concept

## Discussion of Technical Issues

**Rainwater**
The run-off management system has several key aspects.

- Rainwater is collected in swales and directed to lagoons that discharge to False Creek.
- Pre-treated graywater is released into the swale system with rainwater.
- Capacity is designed for the 10 year event of storm flow, with four hours of retention at a two-year storm rate of flow.
- Graywater supply for other non-potable uses is extracted just before discharge to False Creek where it will be the cleanest.
- Future water-purification technology and legislation may allow the purified run-off to be used for domestic water supply.

*System calculations*

3 Lagoons

August Length = 110m

Use August Speed or $\frac{1.16\ \text{m}^3\text{/sec}}{2 \times 1.94\ \text{m}^3\text{/sec} \times 3.42\text{m/min}}$

Flow divided by 3 lagoons and lagoons are 30 m wide instead of 40 m.

Therefore, volume(v) = $\frac{1 \times 3/4}{3} = 0.25$ m/min

Retention = $\frac{110^{\text{m long}}}{125} = 440$ m = 7 hours

A "HYDRO x 1" system could be used in the buildings (especially the towers), with tertiary treatment for graywater from a microfilter

**Graywater**
- The graywater management system has a sequence of treatment stages.
- Graywater is collected from showers and sinks.
- It receives pre-treatment in septic tanks.
- Clarified graywater is discharged into on-site lagoons, designed as a visual amenity.

- The graywater supply is then picked up at the end of lagoons and re-used for irrigation and toilet flushing.

*System calculations*

100L/capita/day (from domestic supply)
population = 5000
$VG = 5{,}000c \times 100 \frac{L}{c\_d} = 500{,}000$ L/d =
500 m$^3$/day (rainy day in November)
Speed through pond = $\frac{500 \text{ m}^3/\text{day}}{34 \text{ m}^2}$ = 14 m/day

At the end of the lagoon, an amount of treated water equal to the graywater input can be removed and pumped back into the system for irrigation and toilet flushing.

*Blackwater (Sewage)*

The blackwater treatment system is built around two issues:

- the development of a demonstration project of solar aquatics/living systems to treat blackwater for two buildings (64 families); and
- expanding the demonstration later, after tests and fine-tuning,interconnecting additional systems to increase reliability.

*System calculations* (Living systems/solar aquatics)

1 m$^2$/capita space required to treat average blackwater in solar aquatics greenhouse.
1 M/R building - 8,000 sq. ft.
8 families of 4 = 32 people
32 m$^2$ for system + well well and pump
$A = X \text{ by } 2X = X = \frac{\sqrt{32}}{\sqrt{2}} = 4$ m

The greenhouse required to treat 32 people's waste = 4 m x 8 m

*Energy*

The energy plan for this proposal has several aspects.

- Fifty to 60 per cent of domestic hot water (DHW) is supplied by solar energy technology on top of mid-rise roofs and on the southeast to southwest sides of towers.
- Later phases have options such as photovoltaics and co-generation, including components such as space heating, DHW, lighting, pumps and fans and electric cars.
- Factors influencing future adaptations include cost, regional power supply/demand profiles and technologies.

**Figure 6.22**

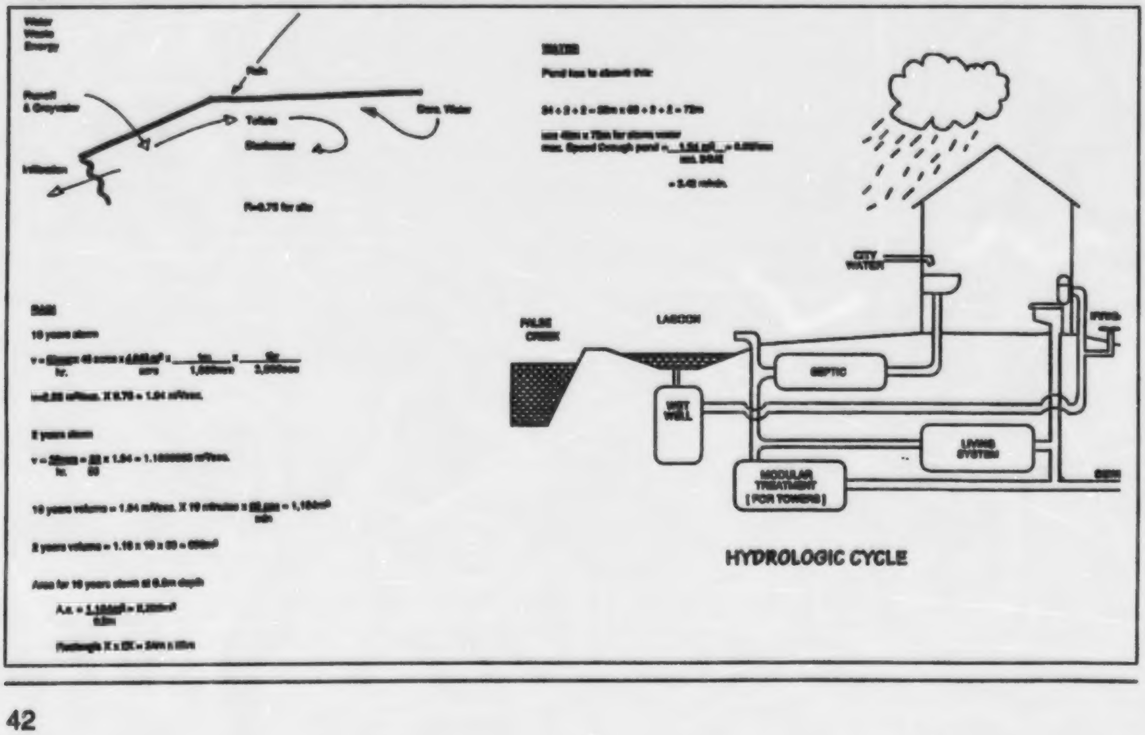

Water
Waste
Energy
Rain
Runoff & Graywater
Toilets
Blackwater
Dom. Water
Infiltration
CITY WATER
FALSE CREEK
LAGOON
SEPTIC
WET WELL
LIVING SYSTEM
MODULAR TREATMENT (FOR TOWERS)
IRRIG.
SEW
HYDROLOGIC CYCLE

**Figure 6.23**

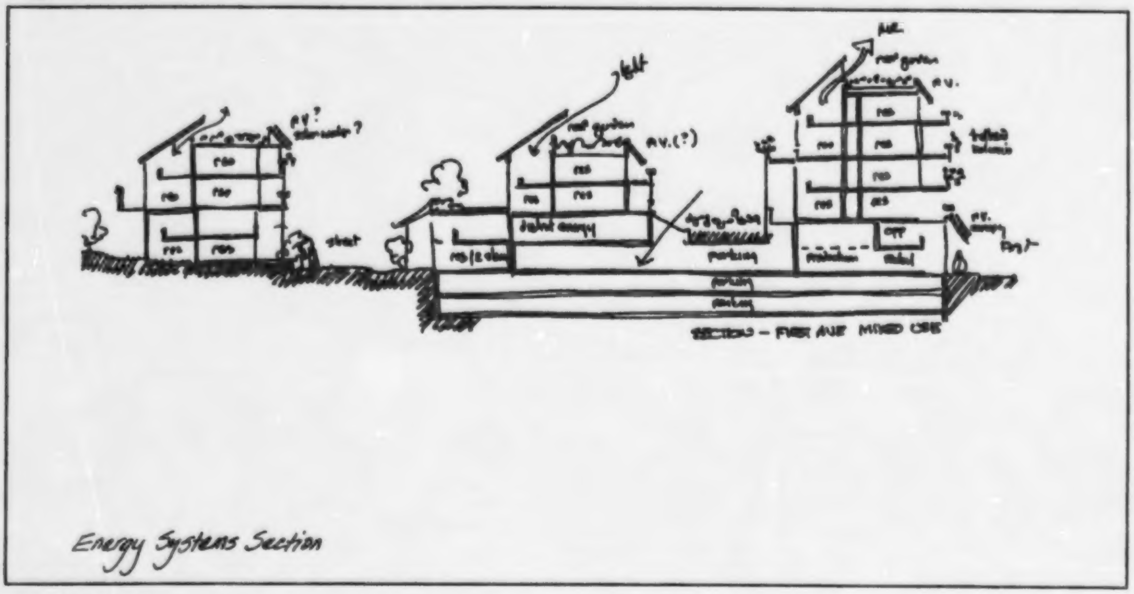

res
PV?
solar water?
roof garden
P.V.(?)
stair
parking
district energy
SECTION – FIRST AVE MIXED USE
Energy Systems Section

**Figure 6.24**

ENERGY

Hot water
Total Winter Usage = 100 L/D_C

Assume 75% is hot water.

Hot water is 75 L/D_C = 20 GAL/D_C

Solar Irradiation 157 W/m²_year
Loc. Factor.86

30% Efficiency – 50W/m² year
with 8m² collectors – 50 x 8 = 400W

Load = 20 GAL x 8.35 lb/GAL x 1 BTU/lb - F x (140-50) / 3,412 BTU/W_hour

= 4,380 W/hour/day

400W x 60 hours/day = 2,400 W_hour/day

solar supplies 1/2 of DHW load
total for 8,000 residents is 143 kwh/m²_year

= 32 people per MR Building

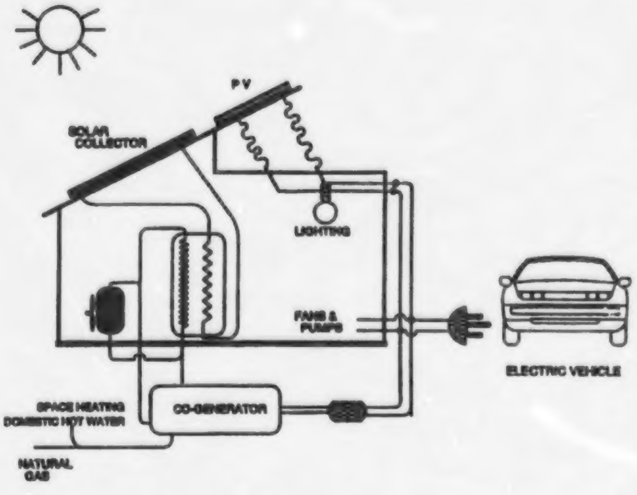
therefore, put in 1/2 of solar collectors for roof area

143/2 = 72 kwh/m²/year

% Building Engergy = 72/365 = 20% (based on winter sun!)

probably supply this way

25 - 30% of engergy
conservative estimate


P V
SOLAR COLLECTOR
LIGHTING
FANS & PUMPS
ELECTRIC VEHICLE
SPACE HEATING
DOMESTIC HOT WATER
CO-GENERATOR
NATURAL GAS

ENERGY CYCLE

*Solid waste*
The solid waste management system has two primary aspects:

- wet garbage collection and composting on site with later adaptions including wet garbage digesters; and
- collection and transfer centres for recyclables toxic waste.

# 7. TEAM 3

The following plan is a natural extension of the city, made up substantially of ground-based rowhousing of 3 1/2 stories, with some 6 1/2 storey buildings at the periphery. It fosters the development of a living neighbourhood through natural interaction and resident visibility where amenities are equally shared. It is a neighbourhood neither isolated as a "project" from the surrounding area, nor overshadowed by highrise towers in its midst. We have treated open space as precious by designing it for multiple use and function. Many of the design ideas are based on sustainable interpretations of the best qualities found in Vancouver's traditional communities and neighbourhoods which have remained desirable, while adapting to change.

## Description of Team Process

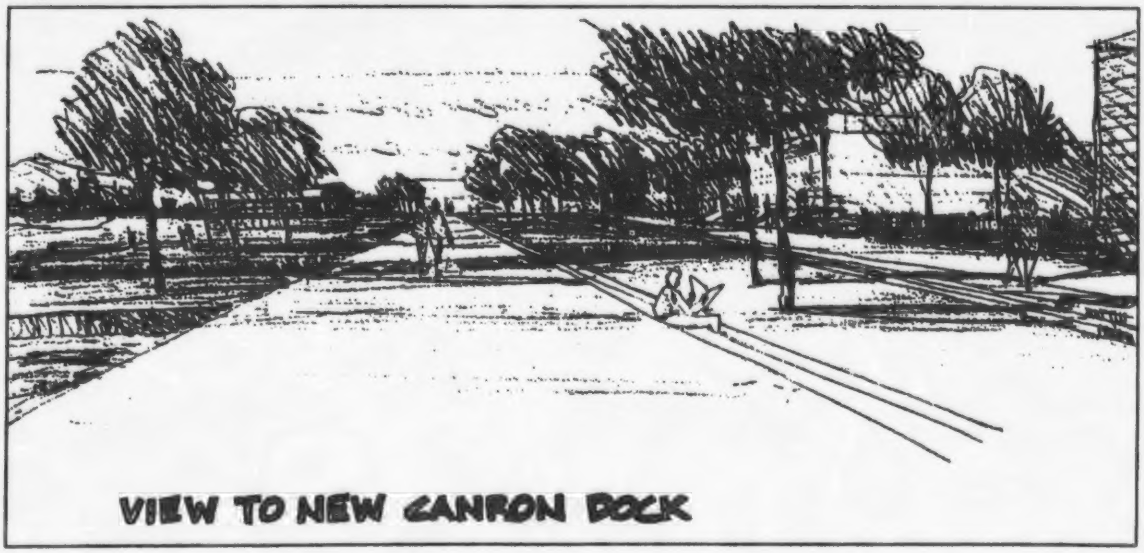
During initial discussions, team members developed a broad consensus and vision for a community on this particular site. We began by writing down goals and objectives, but the discussion remained focussed and progressive enough not to need to refer to them. By the afternoon, the process had shifted to design using paper at the centre of the table to interpret the emerging ideas. We found it unnecessary to break into small groups to develop alternatives. For reason of chance, broad vision or personal chemistry, the team did not encounter major disagreements as it worked to synthesize the ideas into the emerging scheme and create the final drawings.

There was difference of opinion in four areas. With more information and time for evaluation of alternatives, we might have chosen the alternate path.

- Should the direction of the street grid west of Columbia follow the direction of Cook Street or be readjusted to continue the north-south grid?

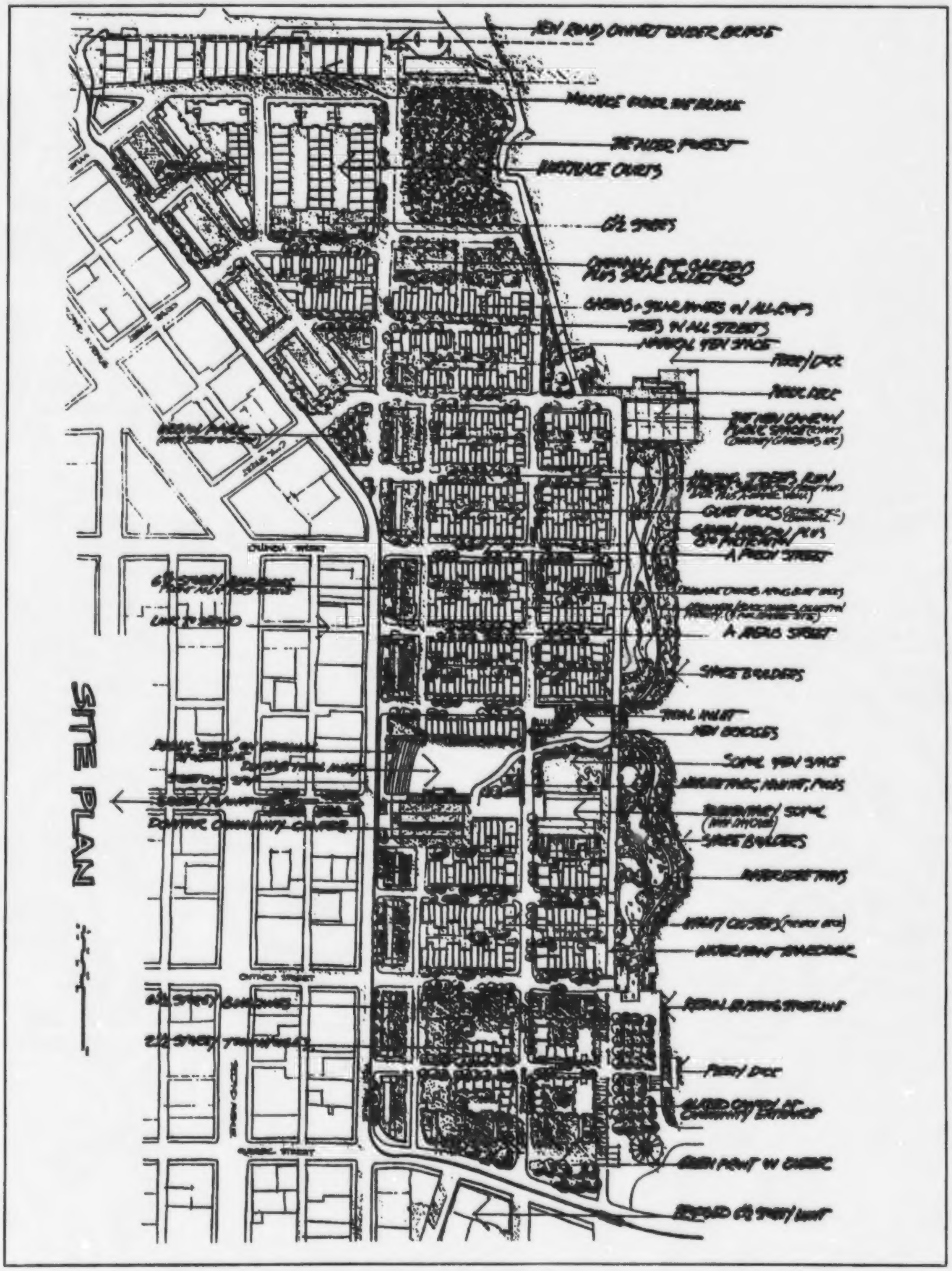
- Should the diversity of landscape treatment along the edge of False Creek be more continuous in terms of design features or be a linked series of more differentiated experience?

**Figure 7.1**



VIEW TO NEW CANRON DOCK

**Figure 7.2**


SITE PLAN
NEW ROAD CONNECT UNDER BRIDGE
THE ALDER FOREST
WORKPLACE COURTS
6½ STOREYS
COMMUNITY GARDENS PLUS SOLAR COLLECTORS
GARDENS + SOLAR PANELS ON ALL ROOFS
TREES IN ALL STREETS
NATURAL OPEN SPACE
FERRY/DOCK
PUBLIC DOCK
THE NEW CANNERY/ PUBLIC SPACE
A PRECINCT STREET
A PRECINCT STREET
STONE BOULDERS
TIDAL INLET
NEW BRIDGES
SOME OPEN SPACE
STONE BOULDERS
RIVERSIDE TRAILS
WATERFRONT BOARDWALK
RETAIN EXISTING SHORELINE
FERRY DOCK
URBAN PARK
LINK TO ISLAND
COMMUNITY CENTRE
6½ STOREY BUILDINGS
2½ STOREY TOWNHOUSES
CYPRESS STREET
QUEBEC STREET

- Should the water inlet be fully tidal or made a freshwater feature? The first is more historic, more dramatic. The second would allow more diversity of habitat and plant material.

- Should the design place parking structures under the low-rise housing or leave the housing to be built directly on grade? On one hand, there is the need and the current practice to place parking adjacent to units. On the other, there is the difficulty and remedial costs of soil conditions in this area. Constructing parking structures at the scale of a block would make it likely that the housing above would be built by the same developer. Or the city would build these communal structures and sell deck-based land lots, a complex and unusual development process. The size of a block would remove the reality of small scale, resident-generated diversity.

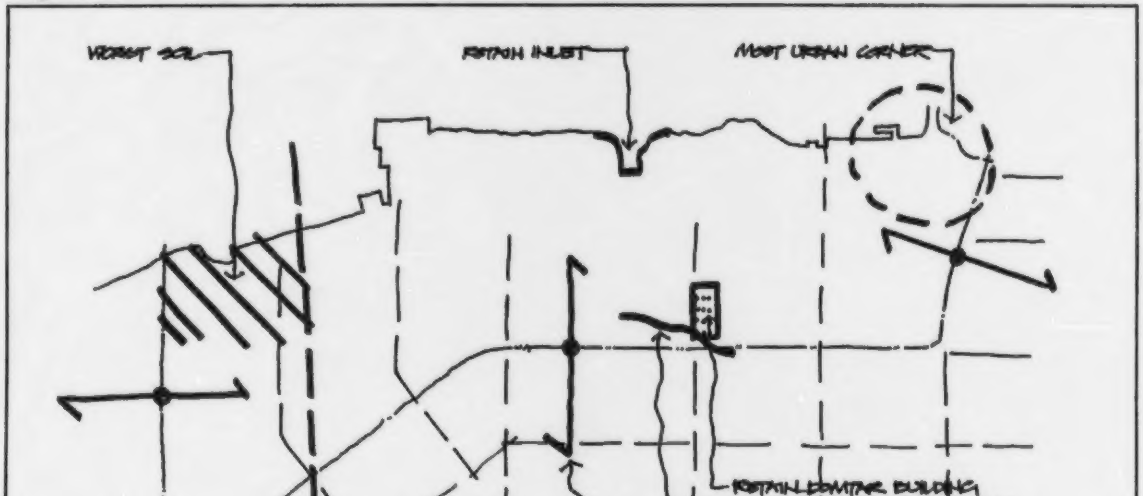
## Description of Design

**Build a street at a time: learn as we go**
The problems of development phasing are of scale, opportunity and completeness. No one wants continual noise, yet how can we go slow to learn from our success and correct our failures? Our design is based on a street concept that includes the idea of building one street complete at a time. In this way, moving from east to west, the neighbourhood can expand, yet maintain coherency at each stage.

The SEFC can be developed incrementally at two levels. The services can be developed in three phases—one third of the site at a time. The buildings could be developed a street at a time. Incremental development has many advantages.

- It allows learning from new approaches in earlier development, and refining their application in later phases. This is especially critical for new technologies, such as surface

**Figure 7.3**



stormwater management, building-integrated photovoltaics, packaged water treatment plants, efficient heating, ventilation and air conditioning (HVAC) and co-generation systems.

- It allows for the capture of anticipated cost reductions of rapidly maturing technologies, especially photovoltaics, solar hot water, efficient lighting and HVAC equipment.
- It provides time for development of biological soil redemption techniques for heavy metals, hydrocarbons. New approaches for heavy metals being applied in mining industries, are only now being considered for "brownfield" sites.
- One-block-at-a-time development facilitates cluster utility services and the interconnection on a neighbourhood scale.
- It reduces the size of capital investment in utilities, road building and land servicing needed at any given time and, thus, financing costs.
- It avoids bringing excess units onto the market until demand is stronger.

With this type of "street-at-a-time" development, the contribution of Southeast False Creek as a place for experiment with the ideas for a sustainable city can continue for many years. Within this very basic, very traditional framework of Vancouver, we can continue the experiment, and learn as we go. Similarly, the pattern of basic services can follow an extending "tree system." Built in stages to serve the initial development, it can extend from east to west when needed.

### Rainwater

Rainwater is collected and treated in swales and estuaries that eventually drain into False Creek. One hundred per cent treatment is probably not possible because of leaching. Rainwater could be collected on roofs and used for toilet flushing and irrigation.

### Working open space

The primary objectives for the upland areas is to provide a dominance of vegetation, to deal with all surface water and to provide a variety of open space experiences.

**Figure 7.4**

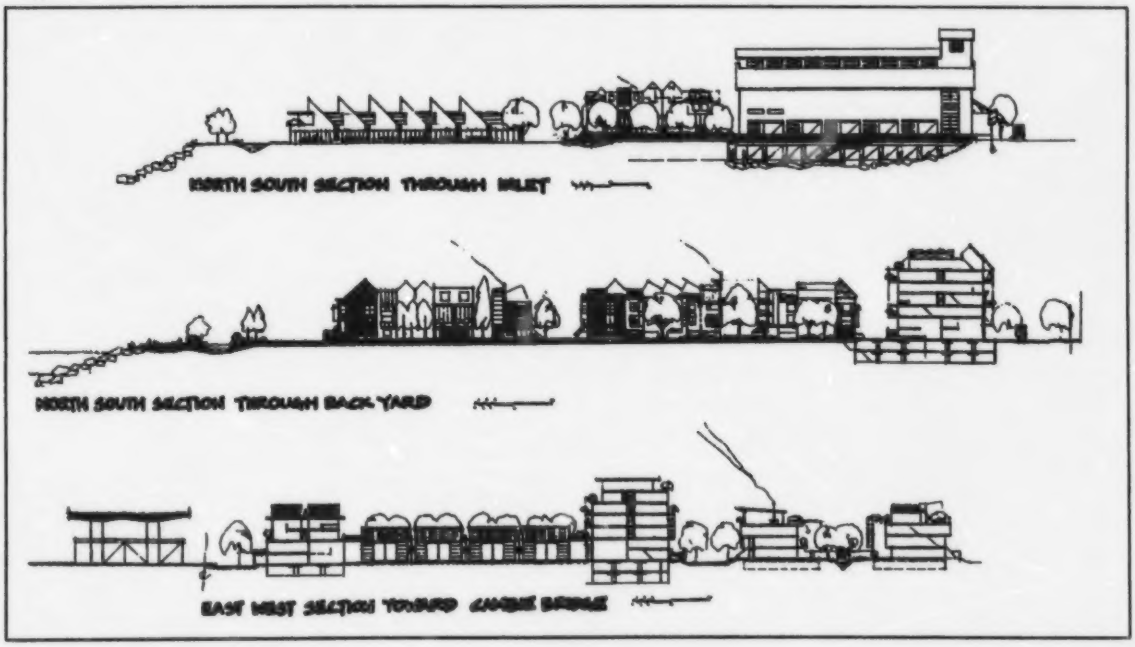

NORTH SOUTH SECTION THROUGH INLET
NORTH SOUTH SECTION THROUGH BACK YARD
EAST WEST SECTION TOWARD CAMBIE BRIDGE

**Figure 7.5**

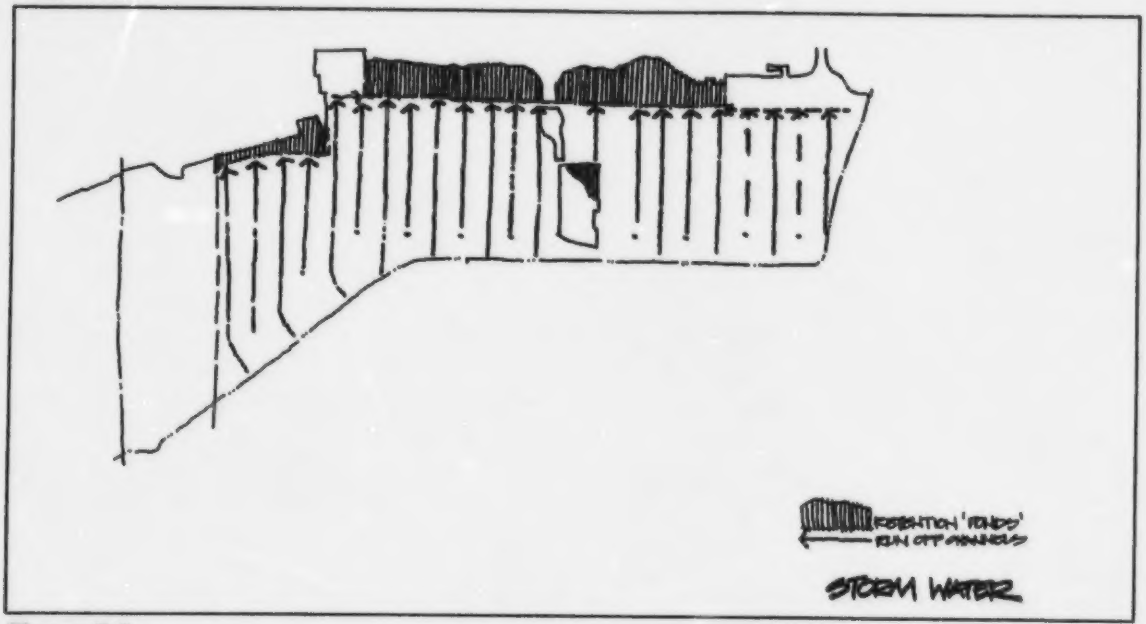
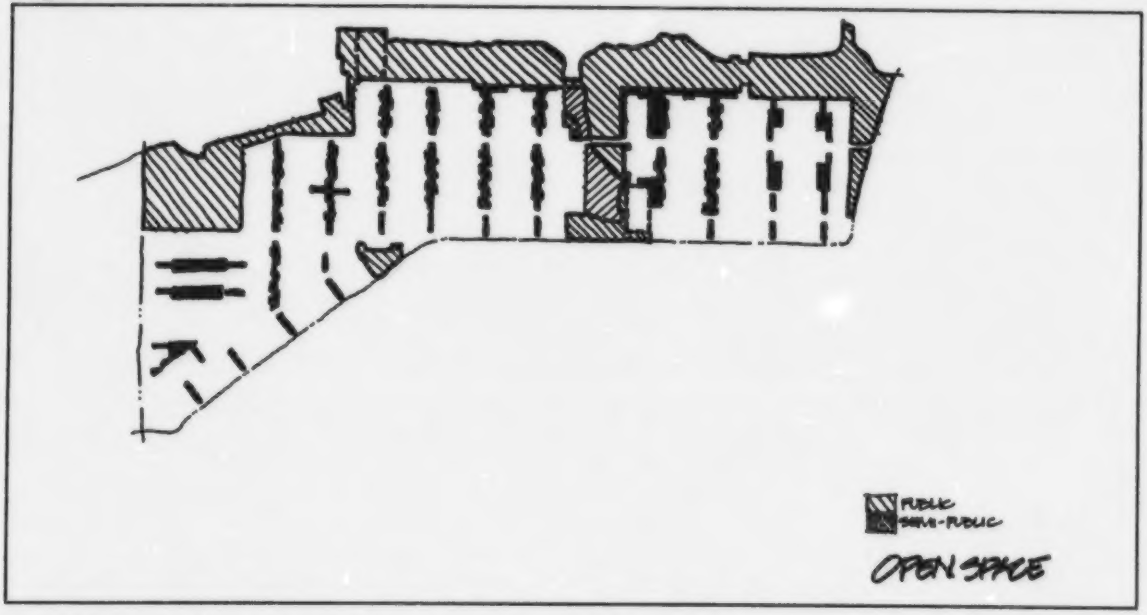

RETENTION 'PONDS'
RUN OFF CHANNELS
STORM WATER

**Figure 7.6**

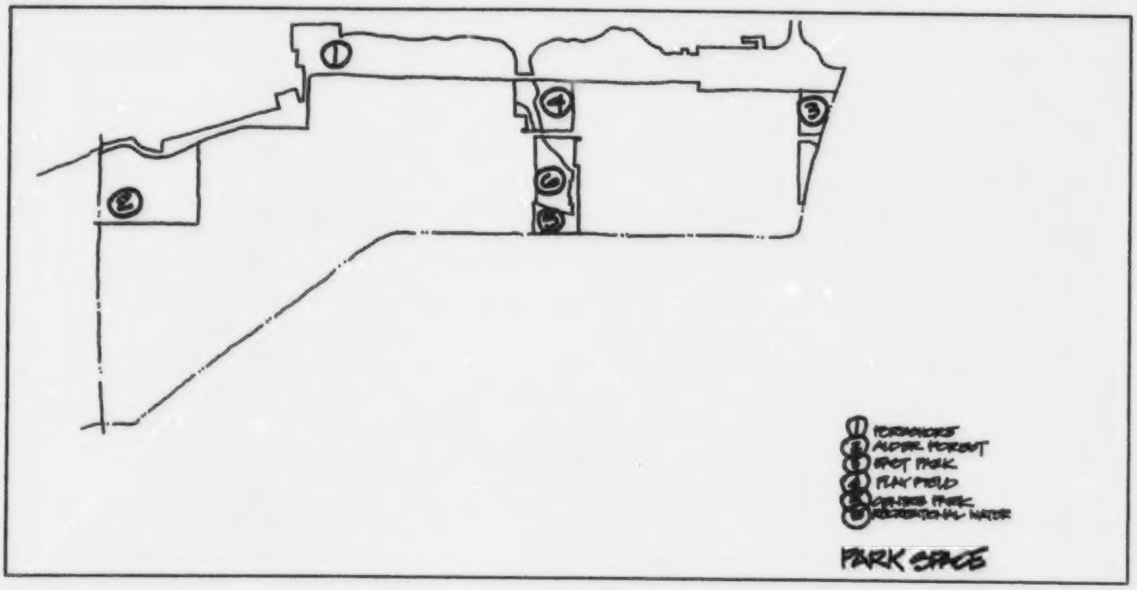

PUBLIC
SEMI-PUBLIC
OPEN SPACE

In addition to the stormwater treatment system in the open space along the shoreline, there are several small open spaces within the community that are allowed to flood during heavy storms. When they are dry, they are small green urban parks.

The quiet backyards have drainage courses though the centre which also lead to the stormwater management system.

The water which flows out of the blackwater and graywater treatment systems irrigates the roof gardens, trees and open spaces. This helps to retain water quantity and quality during the dry summer months.

**Figure 7.7**



**Soil**

Next to the Cambie Street Bridge, on soil with high contamination, we propose an alder forest as a holding measure. As new methods of soil rejuvenation become economically feasible, this property could be opened up for additional public use. In the meantime, the forest and its new plant cycle can provide an important urban "rough" landscape along the water.

**Public green**

We have examined each street and every open space for its ability to play multiple roles in support of recreation, habitat regeneration and mediation. Park areas are diverse in their design and in their plant life. Green spaces contribute to the control of water run-off. Swales and permeable paving filter water. Major streets are lined with trees. Residential street trees are often clustered, allowing space for other species underneath. Roofs can be developed as terraces, water collectors, solar energy panels—whatever the resident feels appropriate. No one need look across at a corporate roofscape. "Green" building faces. Private gardens for residents.

A waterfront walkway delineating the open space along the water's edge varies from boardwalk to paving over its length along a straight east-west path. With bicycle commuting traffic routed onto the proposed "Zero Avenue," the lanes of the waterfront walkway can be easily demarked to sort pedestrian and recreational bike traffic. Loop paths and walks into the natural areas lead down to the water's edge.

The proposed housing streets have green backyard breathing space: quiet, with limited access. Some areas can be developed as semi-public, green space for the adjacent neighbours. Others will prefer to claim private outdoor space for each ground-based unit. Running down the centre of each quiet back is the rainwater collector and filtering system. Some may have a narrow semi-public path for backyard access.

Public green is very much a matter of fine-grain, continuous swaths as opposed to nodes formed by large parks.

*The shoreline*

Most of the False Creek shoreline is not very natural. A primary objective of our shoreline treatment is to provide a more natural, environmentally friendly setting within the urban area.

A nature park is located close to the school and Science World. The park:

- uses native plants in a naturalized setting;
- provides interpretative and educational opportunities; and
- manages the rate of stormwater run-off and improves the water quality through the use of water courses, ponds and wetlands.

The shoreline edge is treated with large rocks across most of the eastern portion of the site. This is different from rip rap. The idea is to armour the shoreline against wave action while also providing opportunities for people to walk and sit on large boulders, and to form pockets for vegetation.

A large tidal inlet extends deep into the site to increase the length of he shoreline and to provide a "coastal" experience to the centre of the site. The area would include sand, rocks, tidal pools and, if possible, some tidal marsh. At the north end of the tidal inlet, a low weir could be constructed to ensure some water would always be retained in the area. The inlet meets the original natural shoreline close to 1st Avenue, adjacent to the Domtar Building.

A large stepped feature, with seating, is located at the south end of the tidal inlet to provide an informal viewing and seating area, and access to the tidal flat, and to reflect the original location of the shoreline.

The open space west of the nature park is also treated with native plants and water features for bio-filtration and stormwater management. The area is more open, with sweeping curves and some grassy meadow-like pockets. While still allowing for naturalization, the openness is intended to provide more opportunities for sitting, and a higher degree of visual security.

The primary shoreline walkway travels straight through the site to the south of much of the open space. It provides a direct route for those passing through so the shoreline pathways can be smaller and more tranquil. A bridge on the primary walkway lets passersby look down over the tidal inlet.

### Residences

The plan meets the needs of the proposed target population. All age and household groups are accommodated. The bulk of housing is provided in ground-oriented, stacked townhouses with a deep floor plate. They accommodate dwelling units averaging 93 $m^2$ (1,000 sq. ft.) together with the potential for basements. It is a resilient housing type and can be adapted and changed over time to many configurations. As incomes or family situation change, the unit can be easily divided to provide rental or shared accommodation. Combination into two-floor units is also possible. Stair location and unit configuration give every dwelling direct access to the public street: no common halls or corridors are required.

The townhouses are wood frame, using new and technically innovative wood products where possible. The configuration is buildable within all current construction codes. We suggest a design guideline requiring that 40 per cent of the street facade be masonry. Houses where basements are not possible will be floated on slabs above contaminated ground.

Our proposal for resilient, adaptable housing is the only way we can see to provide affordable housing without either direct subsidies or bonus height transfers. And, it is much more desirable, for the resulting housing is not "branded" as non-market. Our proposal responds to the increasing diversity in lifestyles by its initial design and its ground orientation.

### Parking

The one space per unit objective was met. We concluded that locating parking within one block, under buildings along 1st Avenue would augment on-street parking and best meet the goals of sustainability. This decision could be revisited if further soil tests indicated that underground parking would be more feasible. Perhaps some blocks could hold parking required for adjacent blocks as well.

Otherwise, because of the unknown soil conditions, we propose that underground parking be avoided. Parking provision beyond street parking is provided under 6 1/2 story buildings, no more than 122 metres (400 feet) from the furthest house. No planters will be needed on vast concrete parking terraces, for there will be nothing to conceal.

**Commercial life**

Commercial activity is concentrated along 1st and 2nd avenues in nodes such as at the community centre. The ground and upper floors in buildings on these nodes have been designed as space that can adapt as needed to meet market demand. A more robust housing/working building form is placed in strategic locations across the site. Located along all of 1st Avenue, these buildings create a harmonious street wall broken by street entrances, the Domtar Building, the water inlet and the tree bosk and covered streetcar stop of a mini-urban park at Columbia Street. In addition, these buildings are located to form a large court adjacent to Quebec Street, within which two-storey townhouses on lanes are situated. Near the Cambie Street Bridge, these buildings are used to block sound, to relate to the scale of the bridge and to define working courts located at grade. (These latter continue under the Cambie Street Bridge.) This area is connected to the city at 1st Avenue and under the bridge in two places, helping to ease the isolation of areas adjacent to the bridgehead.

The buildings are double-loaded corridor buildings with facades that respond to their orientation: extensive green balconies for sun abatement and cooling to the south, glazed balconies to the north. Roof gardens are interspersed with solar panels to augment energy sources. At grade, there is a two-floor retail and live-work or a work/office opportunity. Below grade, two levels of parking give access from the north-south streets. The parking is divided into commercial and residential parking, and parking required by the adjacent housing.

The increasing density at Quebec Street and Terminal Avenue, plus the transit interchanges, bolstered by streetcar and ferry will lead, we believe, to a major gateway into the new neighbourhood from this point. We propose the existing park and waterfront edge be retained and enhanced with a ferry dock, and dense building that can accommodate commercial uses, community space and workplaces on the ground-oriented floors with housing above. In addition, we envision a large glazed canopy here to welcome and protect the pedestrian.

**Offices**

The 1st and 2nd Avenue buildings have been designed as flexible space that adapts to meet market demand. Additional office capacity is available in the flexible live-work accommodations. We see the area adjacent to the Cambie Street Bridge to have a more robust character, in terms of both building and streetscape. This area can provide additional work opportunities in concert with loft live-work space.

**Industry**

The required industrial workshop space is included in highly flexible courtyards arranged next to the Cambie Street Bridge. Non-toxic industry is seen as highly compatible on the western edge of the site.

**School**

Sharing space in the Domtar Building and adjacent to the water and its nature, fronting on Zero Avenue and across from the waterfront open space is the two-story community school. It is in the centre of the community accessible by city streets. Given the adjacency, there should be the opportunity for the school to share some space in the Domtar Building/Community Centre.

**Community centre**

The Domtar Building should be converted to community uses to be determined by the community. Its historic foundation on piles should be brought to light by exposing the western side. We have designed a narrow tidal water inlet to run in from the current False Creek shoreline and open out into a bay whose southern tidal flat edge will be the historic shoreline. The sides of this dramatic water body would be made with caissons so the drama of the tide is clearly recognizable. Hinged ladders/ramps provide access to visitors and schoolchildren. Bridges afford intimate and picturesque glimpses. The western side is encrusted with the adjacent houses.

We propose that part of the Canron Building be reconstructed at the location indicated, together with a ferry stop at the foot of Columbia, to form a natural community focus at the water's edge. The main span of the building should be rebuilt for several bays, with its roof and siding, but remaining partially open to provide storage space for kayaks and small craft, as well as space for gatherings and public events on the water. Seen from across the water, this building will be an important community landmark, a smaller complement to the Science Centre and to the B.C. pavilion.

### Day care

Day care is incorporated with the school in a purpose-built facility in the community centre area. Part of the public green space could be used for protected play.

### Street design

Our aim was to connect the development into the fabric of the city with the city grid applied to the site, but with narrower rights of way. The scheme accepts the car but controls it by slowing traffic with "porch streets." Streets will be familiar, lively, safe and defined with a uniform setback. Diversity and interest come from the design of the dwelling units.

Save for the blocks between 1st and 2nd, west of Columbia, all streets conform to the orthogonal grid of the city. Every dwelling will then have an address on a recognizable street, not in a project with an exotic name.

The development proposes the creation of recognizable neighbourhood streets that run clearly and directly from the existing city straight to the open space at the water's edge. The orientation of the street grid parallels the Cambie Street Bridge to focus the street end views toward the mountains and not to the bridge structure. This orientation allows each resident an equal glimpse of the water and mountains, and affords a changing pattern of sun during morning and afternoon. Sunless north-facing facades are rare. The predominant north-south street orientation encourages passage through the development, down to the water. It can be seen—and reached—from 1st Avenue. Perceptually, Mount Pleasant's streets will all extend to the water. Additional north-south streets are added between the existing ones, intensifying the connection to the water.

1st and/or 2nd avenues become major city connectors. We are not convinced that the neighbourhood high street will develop only along 1st Avenue, since major through traffic will

**Figure 7.8**

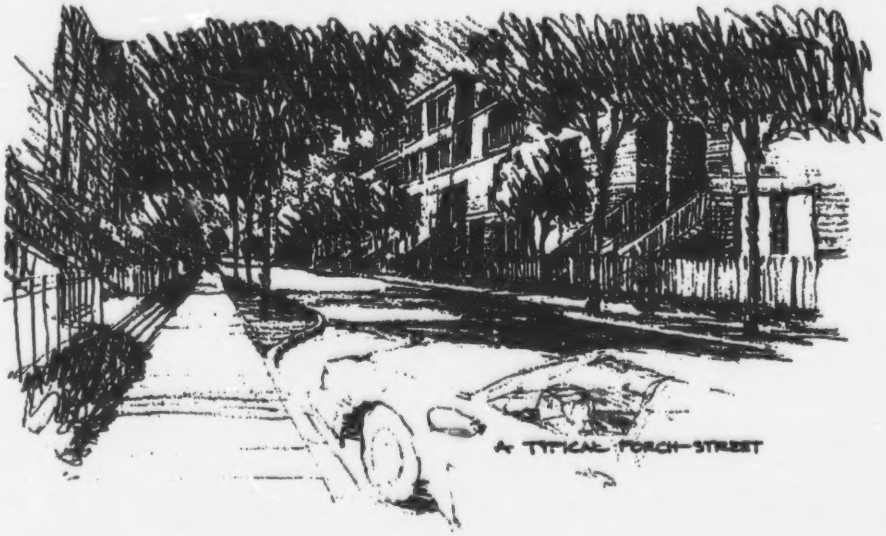
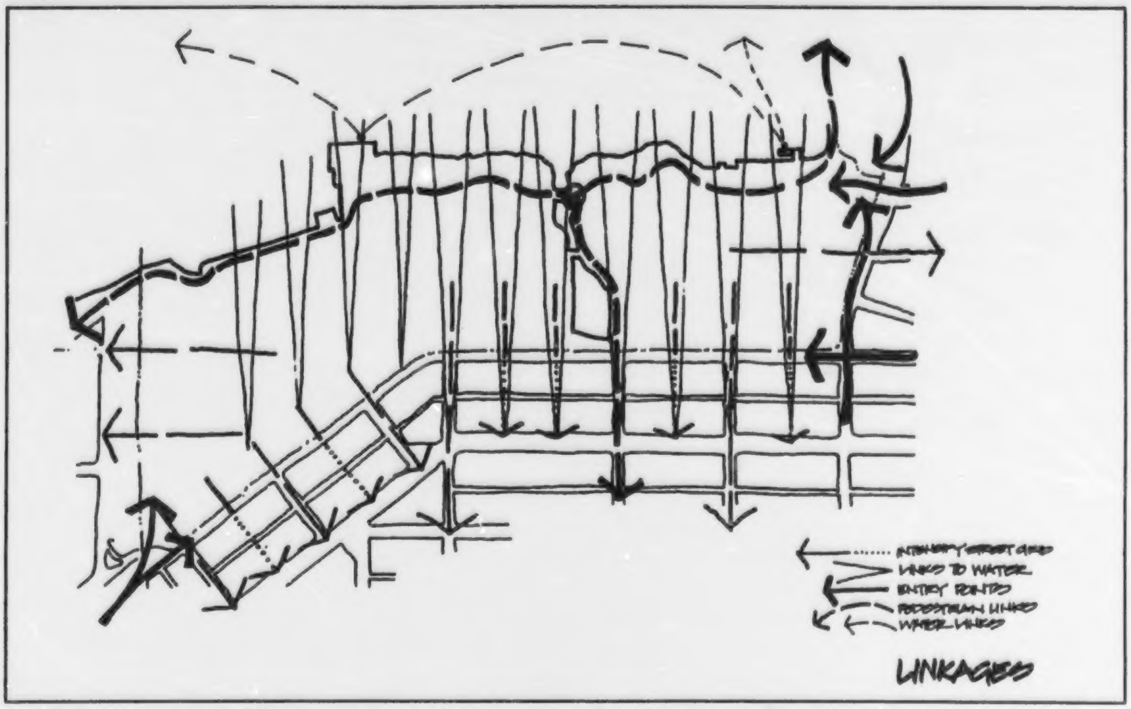


**Figure 7.9**



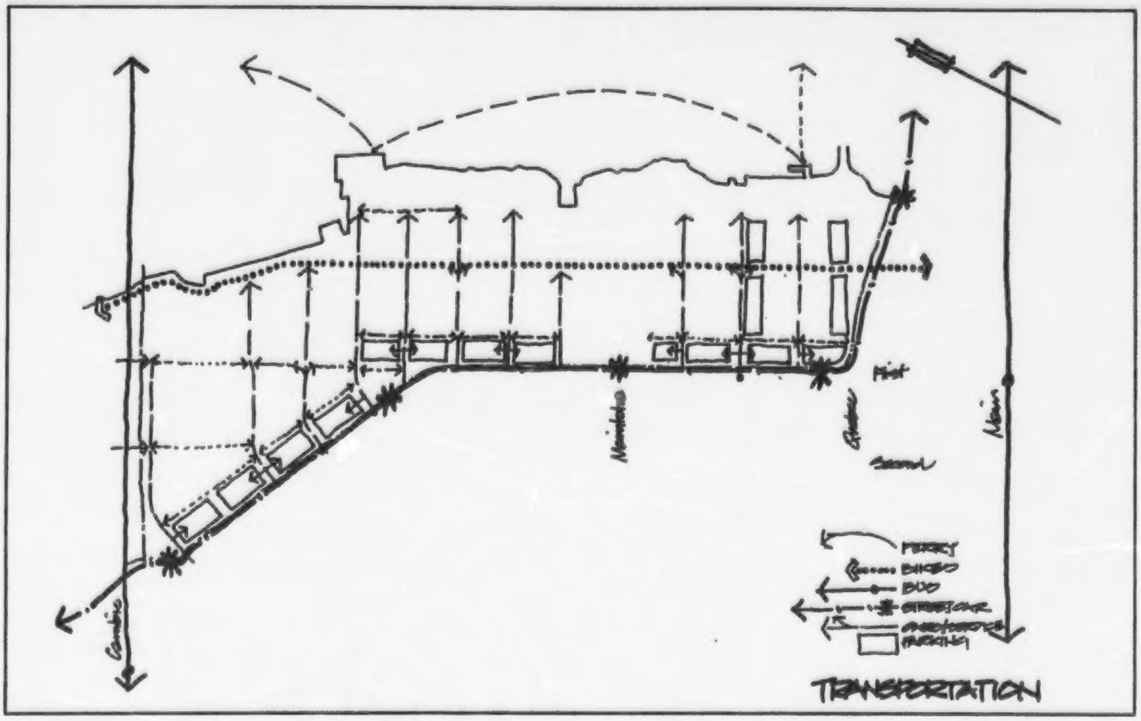
still be dominant along 2nd Avenue which is one block south of the actual site under study. We suggest that future development on the properties between these two streets be asked to provide pedestrian connections mid-block, north-south, to shorten the block length and to heighten the commercial interaction, whatever the outcome of commercial activity over the years. Along 1st Avenue, we propose a major urban street with shopping, workplace, community facilities, all served by ready access to parking under the adjacent building and the tram line with stops at the key locations noted in the plan. North of 1st Avenue, we propose an access lane to provide service to the buildings along 1st and a separation for sun angle to adjacent residential buildings.

Running east-west from Quebec Street through to Crowe Street, we propose a new community collector road called Zero Avenue for local circulation and access from east and west. We include designated bike lanes for a fast and direct commuter bike route. There will be no parking on this street, but it will have clustered service facilities where required.

The building along Quebec Street will likely develop more workplaces and residences that address the street. Their bulk and mass help respond to the anticipated buildings to the east of Quebec that we suggest also respect the 6 1/2 storey limit so as not to cut off False Creek visually from the eastern side of the city. A bosk of trees forms a triangle park that extends the green space of the science centre up into Mount Pleasant with augmented street trees.

The basic tenent of our proposal is the housing street. The maximum block length is less than 76 metres (250 feet), holding 15, three-unit dwellings on each side of a 18 to 21 metre (60 to 70 foot) width from building face to building face. On these streets, there will be at least 100 dwellings with doorways and windows overlooking the public street. These short blocks will be neither monotonous nor endless. Relieved with open space at the end, and with diversity at the intimate pedestrian scale, it will be an urban quality that is familiar to Vancouver. Only the width and height of the streets are innovative. There is parking allowed on approximately 50 per cent of the street length, interspersed with tree

**Figure 7.10**



planting and other appropriate street furniture. The width of the north-south residential streets varies. Every other street has a wider face-to-face dimension, due to the space set aside for porches and stairs. These streets are connected to the city grid to the south, and will accommodate local circulation. The alternate streets are even more local, with tighter face-to-face dimension, permeable paving without sidewalks and designated car parking under tree clusters. These streets will provide the opportunity to use space at grade for garage, workshop or other activity.

**Streetcar**

Transit service along 1st Avenue creates a high street that is less busy than 2nd Avenue.

**Sustainable streets**

The street edges next to the curb are treated with channels that accommodate surface run-off just below the level of paving. These lead water into the watercourses and ponds.

**Parcel size**

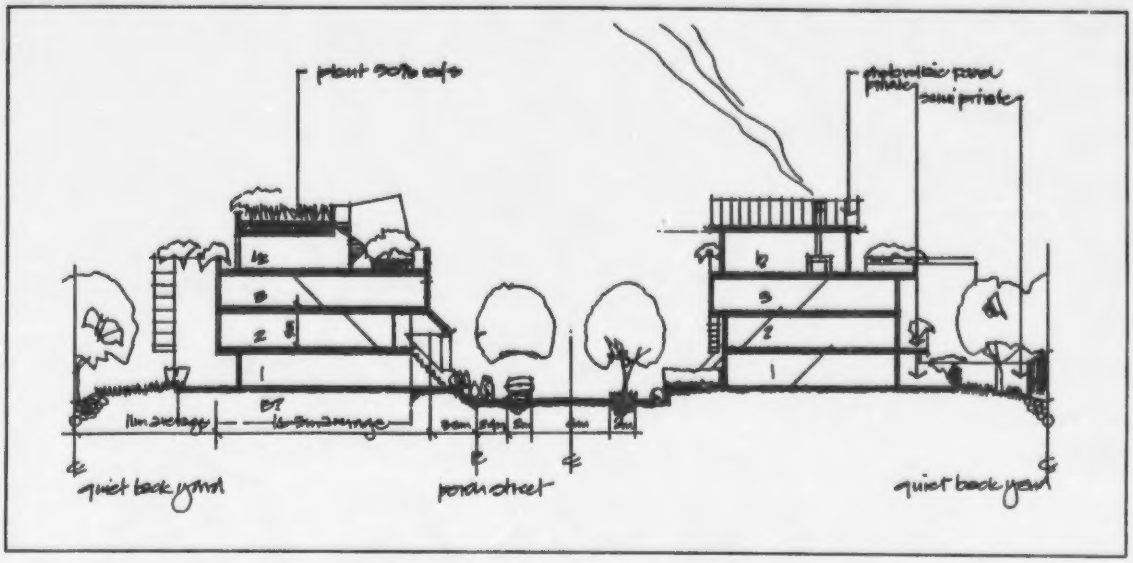
The design replicates the Vancouver city block, with east-west, north-south streets, but shorter than usual for more interaction. In many blocks, there are pathways running through green areas, recalling traditional back lanes. Dwellings have a familiar front and back. The resulting small parcel size allows individuals and small contractors to participate in the building of appropriate diversity. Here, one architect or one large developer will be forced to invent "typical variations." Providing serviced lots is an ongoing city mandate, although this time it will be within a more sustainable context and a sustainable density. We propose a limit of four lots any one owner/developer could assemble into a contiguous parcel.

The fine grain nature of the parcels, in combination with the proposed incremental development also allows for the incorporation of ever-advancing, energy-efficient systems.

**Building energy performance**

Building energy consumption can be reduced by one half with current technologies and little or no capital cost premium, even without ideal solar access.

**Figure 7.11**


plant 50% roofs
photovoltaic panel
private
semi private
1
2
3
12
1
2
3
12
11m average
16.5m average
quiet back yard
porch street
quiet back yard

The north-south street orientation is ideal for natural ventilation and cooling, since prevailing winds are east and west. Building form ensures exposure on two opposite faces, and makes cross-ventilation possible for almost all suites. Very few suites with this layout should require mechanical air conditioning, given solar load control with overhangs, fins and articulated elevations. Building form facilitates the use of ground-source heat pumps.

### Building heights and massing

We suggest no radical height interruption. The building profile follows the profile of the south shore of False Creek. This avoids the isolation of the new community from both Mount Pleasant and the eastern portion of the city. False Creek should not become walled off with towers. The unbroken profile we propose also allows equal access to sun on all housing streets and open spaces as well as equitable views. No physical or psychological shadows from highrises reduce

**Figure 7.12**

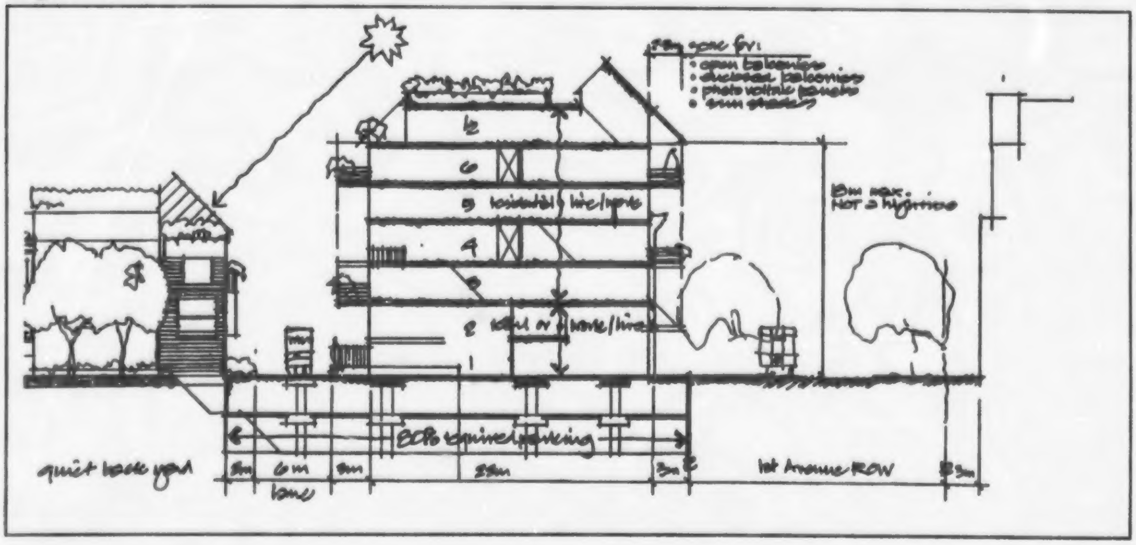
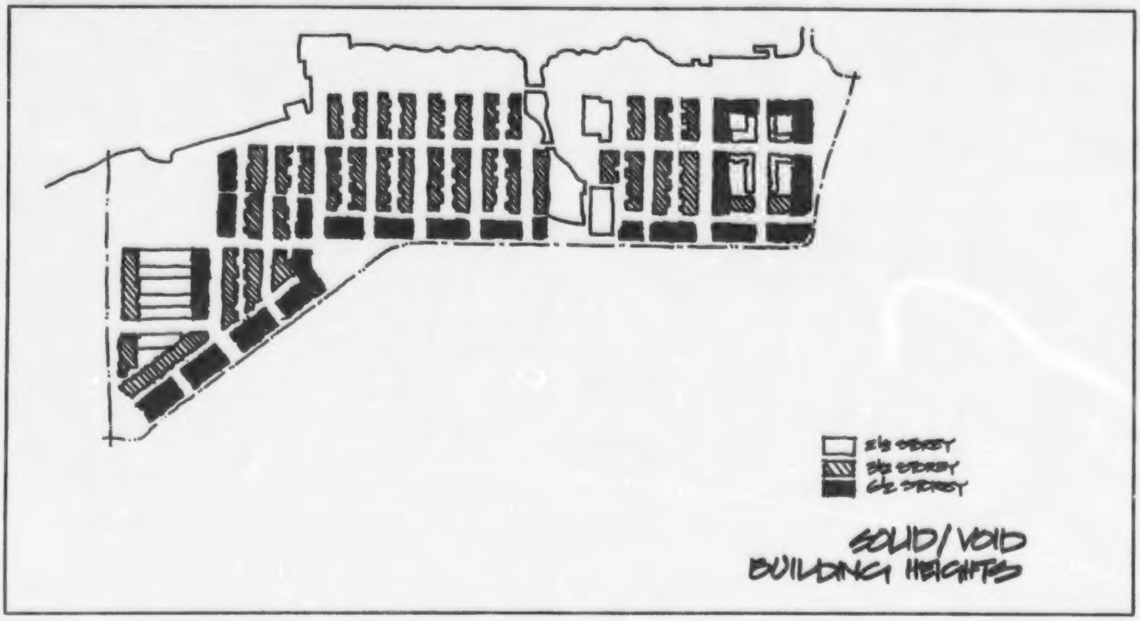

3m zone for:
• open balconies
• enclosed balconies
• photo voltaic panels
• sun shades
12
6
5 residential live/work
4
3
2 retail or live/work
1
18m max.
NOT a highrise
80% required parking
quiet back yard
3m
6m
lane
3m
33m
3m
1st Avenue ROW
3m

**Figure 7.13**



these essential amenities. We believe there is no need for the dramatic architectural form of building towers. The interest they create is peripheral to the fine-grain diversity of detail at a human scale.

The size of development parcel, in addition to the basic configuration and construction methodology we envision, is similar to what is being built along many of the main avenues of the city. Buildings are constructed to a height of maximum efficiency before the extra costs related to highrise construction measures need to be applied.

Low-rise structures should be about 3 1/2 storeys with or without a basement, with quiet rear yards and a three-metre (10-foot) frontyard setback to allow for stairs or patios. Highrises should only be seven or eight storeys with double-loaded corridors and internal courts.

## Discussion of Technical Issues

### Density, street plan and building form

Population requirements and the team's desire to integrate with the existing city street pattern drove street layout and building form; lower required densities would allow better solar access, but may not support mass transit. Transit is the more important issue, since a critical density is needed for sufficient ridership and economics of construction and operations.

### Solar access

The total solar access with north-south streets and east-west suite plans is not ideal for passive solar heating and cooling in spring, since most exposed elevations are on east and west sides. This forces solar collection—photovoltaic, domestic water, etc.—to roofs, where it competes for space with roof gardens. However, most ground-floor suites have at least four hours of direct sun exposure at equinoxes with our plan, and more at summer solstice. The north-south streets and east-west suites allow dispersed solar quality with solar access at different times of day.

### Rainwater

Rainwater collection and storage is intended for roofs, roof-mounted solar collectors, canopies (including those also used for solar collection as well as solar control) and balconies. Rainwater is used for irrigation of landscaped areas and gardens, and requires roof settlement and storage cisterns for gravity flow.

### Graywater and blackwater

Both graywater and blackwater sewage are collected in packaged common treatment facilities. Water is discharged to large stormwater treatment pools and subsurface treatment trenches, ensuring sufficient water to maintain vegetation throughout year. Integrate packaged treatment plants with the proposed cluster utility services.

### Renewable energy

An anticipated 25 to 40 per cent of energy consumption could be delivered by renewable energy generated on site. The 90 per cent target is uneconomical using standard accounting procedures, unless large hydro is defined as renewable (which it is not). Full-cost accounting is likely to make more renewable energy economical.

### Ground-source heat pumps

Ground-source chillers are intended for every two (3 1/2 storey) buildings, with four-pipe fan coils, radiant floors or water-loop heat pumps within each suite. This reduces electricity use and air emissions for heating by a factor of ~4 compared to electric resistance heating. Each building would have several wells; these need not be very deep since the water table is very close to the surface. Rough calculations indicate that a decrease/increase of ground and groundwater is negligible for the entire site services with ground-source heat pumps.

### Solar energy

Roof and wall solar collection areas may be adequate to provide enough electricity for ground-source heat pump operation in future, but, currently, would be very expensive in capital costs. Buildings should be designed to maximize solar collection surface, and to facilitate future use of building-integrated photovoltaics as costs drop (~12 per cent drop per year, currently). Roofs, walls and overhangs are all useful collection surfaces, especially near building tops.

### Solid-waste management

Each block would have a common composting facility for landscaping and household organic wastes. All compost would be used on site to remediate existing soils which are poor in organic matter (except for a few areas with rather too many nasty hydrocarbons). Space requirements: ~2.4 m x 4.6 m (8 ft. x 15 ft.).

A common recycling collection facility could serve the entire neighbourhood, Mt. Pleasant and CityGate. It would require truck access within walking distance of the entire neighbourhood, so the best location is probably near the Domtar Building just off 1st Avenue.

### Cluster utility services

A utility building and network could include block-scale heating, cooling, electricity, telecommunication and solid waste utilities. It would allow incremental interconnection for neighbourhood-wide energy utility services, capturing the load diversity of the entire neighbourhood. It would allow utilities and energy service companies to finance, provide, operate and maintain building services. It has several advantages.

- It reduces the cost of individual residential and commercial units, since the equipment investment is made by utility or energy service company (ESCO), which expects to recoup over a longer period.
- It breaks the pattern of split incentives for developers and occupants in speculator-developed projects; an owner of utility equipment is more willing to invest in efficiency to capture operating savings.
- It ensures professional equipment maintenance, since owners capture savings from better equipment and efficient operations.

- Its space requirements include the equivalent of two or three parking spaces for each block. It could be underground in parking areas, in attached building, (i.e., along Zero Avenue) or in a separate building. Three or four of these could include gray- and blackwater sewage treatment and would require an area equivalent to three or four parking spaces.

- It offers easier access for upgrades of equipment, which is especially important for rapidly developing technologies such as telecom, co-generation, heating and cooling equipment, and water treatment.

- As these enclosed systems do not intrinsically make services transparent to SEFC occupants, we suggest special design efforts to incorporate didactic components (i.e., glass walls to expose equipment, extensive signage and labelling, real-time displays of energy/water demand and consumption, etc).

- It would require exploration of contract wording and possible changes in utility/municipal policies for utility/ESCO ownership and operation of clustered utility services.

**Density calculation alternatives**
We believe we have been able to meet all the quantitative standards set out in the brief. If we are asked to exclude lands currently owned by B.C. transit, this will affect our density calculations. To meet target figures this displaced residential density could be relocated on one extra floor added to the taller buildings without invalidating the quality of the street and urban amenity inherent in this proposal.

# APPENDIX A - THE CHARRETTE ORIENTATION PACKAGE

## CHARRETTE AGENDA

**Tuesday, October 20: OPENING EVENING**
Introductory evening: getting to know each other; orientation to charrette goals/objectives

1700 Arrival; Food and Refreshments
1800 Welcome and Overview
1815 Getting to Know You: Participant Self-Introductions
1930 Roles and Process "Rules"
1940 Stretch Break
1945 BMH Presentation and Q/A
2030 Design Brief and Performance Criteria
2115 Getting to Know You Better: Team Breakout
2145 Next Steps, Check In, Closing.
2200 END

**Wednesday, October 21: DAY 1**
0830 Circle Check In and Last Minute Details
0845 Team Work Starts
1200 Lunch Break
1300 Team Work Continues
1600 Re-gathering
1615 Check In and Closing
1630 END
1700 GROUP DINNER

**Thursday, October 22: DAY 2**
0800 Team Work
1200 Lunch Break (can be working lunch or?)
1300 Team Work
1600 Re-gathering
1615 Check In and Closing
1630 END
TEAM WORK CONTINUES (Independent)

**Friday, October 23: DAY 3**
Team Presentations and Celebration

0800 Walk About and Graffiti (silent reflection)
0900 Opening Circle
0915 Team Presentation 1
1000 Team Presentation 2
1045 Team Presentation 3
1130 Discussion
1200 Closing
1215 CHARRETTE COMPLETE
1230 CELEBRATION! Lunch and Chat

## GENERAL

Members of various communities of practice are being drawn together for this charrette. With the diversity of knowledge and experience represented by participants, different perspectives and ways of seeing are anticipated (by design). We expect everyone to bring a willingness to both listen to others and to contribute to the collective task. Our intention is that our work together will be built on principles of openness, flexibility, cooperation and respect.

### Design Team: Specialists

"Specialists" on each design team include two architects, two landscape architects, an engineer, a planner/policy regulator and a developer/economist. One architect and one landscape architect bring background experience in large-scale urban development projects, often within traditional constraints. The other architect and landscape architect bring knowledge and experience in "green" planning and "new urbanism." By virtue of their training and experience, many of the team members will span the specialist categories.

It is intended that all team members function as equal partners using a shared leadership, co-creative approach. That said, it is anticipated that one member will probably function as the lead team facilitator during the charrette to ensure the team stays on track and doesn't get bogged down unnecessarily. The team will also need to determine who will take the lead post-charrette, to prepare the team summary and coordinate the "polishing" (e.g., drawings, graphs) efforts and who from the team will participate in the "polishing." (Additional funds will be provided for the post-charrette work). The "polished" team output and summary are expected to be completed by November 6.

The primary goal of the charrette is to test policy by generating design options for the SEFC. In general, all team members should be attentive to areas where policies may be overly restrictive or insufficiently specific in providing direction for the development of a sustainable community. Recommendations for change are appropriate. For example, areas where policies may unduly compromise livability or sustainability, should be noted. The planner/policy representative on each team has responsibility for ensuring that discussions and the decision-making process regarding policy issues are well tracked and documented.

## Design Team: Students

Each team will have the benefit of new insights and support from four architecture and landscape architecture students from the University of British Columbia. At the very least, their presence should remind us that we are all learners here. All the students have completed a "studio" focussed on the SEFC. The studio explored various urban design precedents, both from Vancouver and abroad, that might be applied to the site. The students then used the same design program as the one you have been provided to produce their own designs for the site—completed the week before the charrette and available in a publication at the charrette. The students, therefore, have knowledge of substantive issues and have already generated proposals for the site.

All the students have volunteered to participate as apprentice members of the design team and have been made aware that the setting is more like a design office than a classroom. Students will share what they know, learn, follow the instructions of team leaders and help as necessary to facilitate the completion of all charrette tasks. Students are especially responsible for obtaining information from the resource team (as needed) and for finding ways to transform technical information into concrete proposals. Working closely with other design team members, they will also provide additional "hands" for drawings and other visual requirements for discussion and presentation.

## Resource Team

The resource team includes members with specialist knowledge in such areas as:

- interrelationships between housing, the environment and the economy;
- sustainable community design;
- adaptable housing designs and housing affordability;
- indoor air quality, ventilation, moisture;
- materials durability and embodied energy;
- zero-impact buildings;
- repair and retrofit options;
- energy efficiency and energy alternatives (e.g., solar, wind and photovoltaic);
- water conservation and re-use strategies;
- contaminated soils;
- site restoration;
- transportation (e.g., diversity options; greenhouse gas emissions from urban travel);
- landscaping (e.g., options for cost and resource efficiency); and
- aquatic habitat protection.

As their area of primary responsibility, resource team members will provide information and support as requested by design teams. That said, it is not intended that the resource team function merely in response to the design teams (we don't want you to get bored). Resource team members are also asked to engage in the two additional tasks particular to their areas of expertise:

the articulation of key issues and, as appropriate, the generation of design ideas. These should be posted for viewing by the design teams. Second, the resource team is tasked with a critical examination of policy documents in areas related to their expertise. We also anticipate that resource team members will discuss the implications and interconnections of various issues and ideas and achieve additional insights resulting from their combined knowledge and experience.

# APPENDIX B: THE CHARRETTE DESIGN BRIEF

## Impetus for Change

On October 26, 1995, Vancouver City Council voted to remove a 32-hectare (80-acre) waterfront site from industrial use (approximately 19 hectares or 47 acres of this site are city owned). The Council then asked the Planning Department to explore the development potential of the Southeast False Creek (SEFC) parcel and to meet a higher standard of environmental sustainability and energy efficiency there than at other approved development areas. The goal was to have the SEFC become a model for sustainable development both in our city and beyond. In this context, Council identified seven priorities for the SEFC.

- Housing should be the predominant form of land use.
- Housing for families should be a priority.
- Energy-efficient community design should be incorporated into the community plan.
- The potential for using city lands as models for sustainable development should be explored.
- A transportation corridor capable of facilitating a streetcar line should be incorporated.
- Housing and employment should be brought closer together.
- Housing should be increased adjacent to Vancouver's central area.[2]

## Reports and Studies

*The Creekside Landing Plan*

"Following the completion of a public proposal call and selection process by the City, on June 11, 1996 City Council appointed Stanley Kwok Consultants Inc. as Development Consultant for the Southeast Shore of False Creek. Kwok Consultants was to report directly to the Property Endowment Fund Steering Committee,"[3] (hereafter referred to as CL). its first task being to produce a detailed development study. The purpose of the study was to identify "economically viable options for the City owned lands at the Southeast Shore of False Creek, taking into consideration all pertinent City objectives and policies" (CL, 4). This study was submitted to the Property Endowment Fund Steering Committee on January 2, 1997. On May 8, 1997, council received this report and approved several of its recommendations, including the following.

- The planning process should proceed with a special emphasis on sustainability.
- While city policies, guidelines, standards and by-laws should be the starting point for planning, Council will consider variances of the rules in exchange for compelling community benefits within an environmentally sustainable and economically viable framework (VTT, 4).

*The Visions, Tools and Targets (VTT) plan*

In response to the above recommendations, the Central Area Planning Branch of the Vancouver Planning Department prepared terms of reference for a more detailed study of sustainable principles and practices (VTT, 4). This study would:

- provide council, staff, consultants and the community with a clear definition of sustainable development;
- establish performance targets to guide the planning and development processes;
- establish a data bank of relevant precedents regarding the parameters of sustainability; and
- provide a framework for full-cost accounting as a basis of redeveloping economic information regarding development scenarios.[4]

Sheltair Scientific Limited of Vancouver was retained and its study, *Visions, Tools and Targets: Environmentally Sustainable Development Guidelines for Southeast False Creek* was tabled on April 18, 1998. It identified a score of different, measurable sustainability performance targets that the City should attempt to meet at the SEFC. A summary of this lengthy study by Central Area Planning Branch staff can be found in Urban Sustainable Development: Southeast False Creek. City of Vancouver Planning Department. (1998). *Urban Sustainable Development, Southeast False Creek.*[5] The USD report, while not intended to be formally adopted as official city policy, informs and is, in large part, incorporated into the Southeast False Creek Sustainable Neighbourhood Policy Statement discussed below.

### The Southeast False Creek Sustainable Neighbourhood Policy Statement

The Central Area Planning Branch also produced *Southeast False Creek Sustainable Neighbourhood: A Policy Statement to Guide Development. City of Vancouver Planning Department.*[6] (1998). (henceforth referred to as PS). Policy statements of this kind typically describe general planning principles intended to guide future site development. The PS is exceptional in that it attempts to blend a host of new environmental, social and economic sustainability principles with more conventionally applied planning guidelines vis-à-vis density, open space, parking and land use. Given the unprecedented nature of this attempt, the PS is also intended to be a flexible document. In the spirit of experimentation, it must allow for many different design responses and be capable of adapting to new circumstances and unforeseen opportunities.

## This Design Charrette

As a result of Council's directive to create a more sustainable community, the VTT's performance targets, and the PS's broad range of conventional best-practice objectives and sustainability-based principles, the City is now moving to implement redevelopment policies for the SEFC. This charrette is a crucial part of the implementation process. We are asking participants to incorporate the possible concrete consequences of these policies in urban design proposals and, thus, to show what a more sustainable community could look like on this site. The results will be used as a guide for Vancouver's elected and appointed officials in determining the future form of this community. These results will also be valuable to many communities across North America, as the SEFC initiative represents the first time a North American city has used sustainability principles to guide a project of this magnitude. With no North American precedents to guide it, the City hopes this charrette will help determine which, if any, of the performance objectives for the SEFC are set too high and which, if any, are set too low.

### Design brief

We have worked primarily from the two key documents that pertain to the SEFC development in producing this design brief: the PS and the USD. The performance targets and requirements that appear in those documents also appear in the brief. Consequently, the design solutions that meet the objectives and requirements of this brief will not merely represent the personal visions of team members, but will also demonstrate the teams' interpretation of the draft policy statements to Council, staff, the larger community and, importantly, the development consultant and architecture/planning consultant hired to develop the plan for the City's land holdings at the SEFC.

### Goals and objectives

The goal of this charrette is to provide Council, staff, consultants and the larger community with different design options for the site, each of which represents a clear vision of what a community built in conformance with the proposed policies would be like.

Objectives include:

- Test the efficacy of those aspects of the proposed policy statement and the performance targets that would be manifest in urban design before an attempt is made to apply them.

- Create a setting in which leading British Columbia designers can exchange ideas and viewpoints with outside experts in the field of sustainable design.

- Establish new, more sustainable, urban typologies to guide the planning and design of this site. These typologies would then be used as prototypes for other sites.

- Illuminate the connection between sustainability and livability.

- Make the sustainability functions of the site both transparent and didactic so the SEFC can serve its residents as well as educate the world.

### Instructions to teams

The design brief that follows is broken into four sections.

- *Land and Water* covers issues associated with the ecological health of the site, including the water that it contains and the water by which it is surrounded.

- *The Built Environment* covers issues relating to the buildings and landscapes that will be added to the site.

- *Building Design and Environmental Performance* covers issues relating to more sustainable building construction.

- *Cycles of Growth and Waste Decay* covers physical and social issues relating to material flows both on to and off of the site.

### Land and water

The City of Vancouver is committed to reducing its part in the degradation of the land and water our region and, on a case-by-case basis, to remediating the degradation produced by insensitive earlier development. This commitment is intrinsic to the Southeast False Creek Sustainable Neighbourhood initiative. The specific elements of this broad objective include four performance areas.

*The freshwater system*

**Clean in, clean out**. Rainwater falling on the site should either be absorbed in the soil, gardens and built structures of the site, or it should leave the site as clean as it was before it fell. At least 50 per cent of the site should be pervious (e.g., a rooftop garden is a pervious surface) (USD, 24; PS, 41).

**Visible systems.** Ecological systems that are hidden are difficult to respect and cherish. Rainwater channelled across a site dramatically reveals the workings of the rain/stormwater system. The City is interested in implementing a surface system for managing storm run-off (PS, 42; USD, 28). The process of moving, cleaning and infiltrating rainwater should be revealed, celebrated and explained as part of the design (USD, 29; PS, 42, 49).

*Open spaces*

**Working green.** Green spaces, in addition to satisfying demonstrated recreational needs for area residents, should be working spaces that clean water, provide habitat and improve soil by absorbing green waste (PS, 13). Approximately 60 per cent of open space should have habitat value (USD, 27).

**Ecological infrastructure.** It is important to establish methods for ensuring that roads, plazas and other open spaces contribute to ecological and cultural sustainability goals. For example, they should clean water, provide habitat and accommodate pedestrians, and they should do all this cheaply, simply and intelligently (USD, 28).

**From "open" space to "sustaining" space.** The City is proposing to apply the standard of 1.1 hectares (2.75 acres) of open space per 1,000 resident population (PS, 12). In the past, only traditional park spaces—spaces offering mowed lawns, ornamental plantings, and passive and active recreation areas—have been included in this total. This has excluded interior courts, rooftop spaces, multi-use streets and shoreline walks. Adhering to the 1.1 hectare standard makes it difficult to meet overall site density goals.

For this charrette, participants are asked to think more broadly about the public objectives that underlie this standard and to make a case for meeting this public policy goal as they see fit. The City has already made some concessions. For example, the community centre will be located within the "open space," and whatever area it occupies will be counted in that total. In some open space areas, there exists the possibility of combining functions. For example, bio-remediation marshes could be located as part of park space and count in the 1.1 hectare total. Although care must be taken not to exclude traditional active recreation areas, the City does not see a need for a full-sized baseball facility. So the 1.6 hectares (four acres) of open lawn that would have been used for such a facility can now be used for urban squares, green streets that incorporate "park-like" activities, bio-remediation features and tidal marsh areas—to name but a few of the many possibilities.

This charrette provides a chance to reassess the real public purpose of our urban green spaces and to put forth ideas and proposals for change. And its participants are strongly encouraged to do just that.

**Its for the birds.** Habitat for at least 30 bird species can and should be provided on the site. This number is approximately that presently found on or near False Creek (USD, 26). Sixty per cent of the open space at the SEFC should have significant habitat value (USD, 28), while 40 per cent of the foreshore length should have significant habitat value (USD, 28).

**Restore the living edge.** Eighty per cent of the foreshore length should have habitat value (USD, 28). Shoreline alignment can be changed to increase habitat diversity and to re-establish coastal marsh habitat (PS, 15).

### *The soil*

**The problem.** Most of the site was marshland or open water. As only structural reasons were considered, solid fill was used to build up the site. This meant that no regard was given to soil hydrology, fertility or soil toxins. Portions of the western half of the site contain "special waste" soils, that is, soils that are dangerous enough to require special handling and that should not come into long-term contact with humans.

**A sustainable community on bad earth?**
A sustainable community is one in which the natural processes of rain, infiltration, growth, decay and regeneration are respected and worked with. Once disturbed, these natural cycles are difficult to re-establish. This is true even under the best of circumstances. On a contaminated site, the problem is much more complex. The city anticipates spending $25 million on a combination of measures that will likely include capping certain areas with an impermeable seal and removing particularly polluted soils in other locations. This strategy, while not intended to clean the soils, would remediate soils up to an acceptable level.

Certain questions are unavoidable and should be addressed by the charrette teams. For example, is there a contradiction between the idea of rainwater infiltration which, in principle, is a good method for cleaning water and regulating soil and stream hydrology, and sending relatively fresh water into toxic soils? Is there a contradiction between encouraging species diversity on the site while there is a possibility that heavy metals might move up the food chain from soil, to tree, to bird?

**Creative ways to restore the earth.** Can we imagine some kind of environmental infrastructure that could heal the site and stay within (or below) the $25-million range? Would this healing occur right away or require time for nature to do her work? These issues pertain not just to this site but to hundreds of others throughout North America. Nearly every major city is slowly converting former industrial lands for residential and commercial use. Creative solutions are desperately needed—solutions that attend not only to the risks involved, but also to the need, through the application of natural processes, to heal past insults to the environment. Design teams are strongly encouraged to produce design ideas that could, if implemented, heal the site, provide recreation and habitat, and save money—all at the same time.

### The built environment

The goal of City of Vancouver public policy is to provide adequate, affordable and appropriate housing for all citizens. A sustainable site and community design must integrate, not segregate, land uses, income groups and family types. Services, jobs and transit must be located near homes. Charrette participants are challenged to integrate office, workshop and various residential types, recognizing that integration and heterogeneity are more sustainable principles for city building than are segregation and homogeneity.

Ways of moving people and materials around the site, as well as on and off it, should also be integrated and heterogeneous. The necessity for material and people flows both into and out of the site should be reduced. Waste, energy use and an unreasonable dependence on cars would be modified downward as a result of such a reduction.

#### *Residential life*

**Residential land-use efficiency.** Locating a dense residential area close to the job centre of downtown Vancouver will reduce sprawl in the suburbs and the consequent waste of land and energy (USD, 34). The City is proposing to allow roughly 297,280 m$^2$ (3.2 million sq. ft.) of new construction on city-owned land, about 278,700 m$^2$ (three million) of which will be residential and roughly 18,580 m$^2$ (200,000) of which will be commercial, workshop or service office use (PS, 29). Assuming an average unit size of 93 m$^2$ (1,000 sq. ft.) and an average family size per dwelling of 1.75 persons, there will be 5,250 residents on the city-owned portion of the site. Since there are 19 hectares (47 acres) of city-owned land on the site (CL, 14), the gross "floor surface ratio" (gross FSR, i.e., the ratio of interior floor space on all floors to the total site area, which in this instance, includes roads and parks) is approximately 1:6 (CL, 33). The net FSR (i.e., the ratio of interior floor space to the site area exclusive of roads and parks) will be approximately three.

**Parking standards.** No urban design brief would be complete without a section on parking standards. The irony of establishing parking standards for a project in which the ideal would be to eliminate cars is not lost on the charrette organizers. The City is planning to lower, but not to eliminate, the parking standard in the SEFC and, thus, it is hoped, reduce the importance of cars to the SEFC community. The City, recognizing the many advantages of keeping parking standards to a minimum, has been gradually reducing standards in central-area developments. For this charrette, the standard is one car space, on average, per dwelling unit (this is less than half the typical suburban standard). However, in some areas, this standard might be even lower (which means, in others, it might be higher). Additionally, street spaces can be used to meet this standard. In this way, traditional patterns of relatively high-density townhouse development (as in certain Toronto districts), where parking occurs in streets and, to a lesser extent, in lanes, would be allowable.

**Housing for all.** City policy calls for accommodating a diverse mix of incomes and family types, and for providing housing appropriate to all of life's stages. The mechanisms for achieving this are not spelled out. Certain crucial aspects of this principle have more to do with whose name is on the deed—with ownership and management—than with the visible design of a structure. Clearly, the charrette designs can only touch on the physical aspects of this principle.

**Homes for all incomes.** At least 20 per cent of the housing units should be for persons whose family incomes are in the bottom one third. PS, 20. These units will likely be subsidized rental units managed by a non-profit housing agency. Units will be leased from building owners on a 40-year lease. Overall, a minimum of 35 per cent of the units should be suitable for households with children. Also, it is important to consider the relative advantages and disadvantages of dispersing or, conversely, concentrating family units on the site (PS, 20).

**Homes for different lives and life stages.** There should be a balance of housing types that meet the needs of a range of ages and lifestyles and that are affordable to groups and individuals having a wide range of incomes. Housing should accommodate different sections of the population and should be flexible enough to accommodate each stage of a person's life (USD, 35).

**Homes for those who may or may not stay.** Renters, no matter how long they intend to stay, should feel as "at home" in this community as do those who have invested in it financially (PS, 20).

*Commercial life*

**Commercial services within easy reach.** All residential units should be located within 350 metres (a three-to-four-minute walk) of basic shopping needs and personal services (USD, 12).

**Integrated commercial life.** Residential and retail land uses should be integrated whenever and wherever appropriate (PS, 22). Combined workshop/retail and residential units should be considered for mixed-use buildings.

**Serve the city.** Commercial activities should be located to invigorate the area and to serve and welcome the surrounding district (PS, 21). While not intended as a fixed requirement, providing 0.3 m (1 ft.) of commercial space for each 4.6 m (15 ft.) of residential space provides a reasonable point of departure (PS, 29). Design teams are encouraged to discover and put forth a rationale for either more or less commercial space than this amount.

*Productive and creative life: offices*

**Services for residents.** These should include frequently used neighbourhood offices in mixed-use buildings within close proximity to all residents (PS, 23). While not intended as a fixed requirement, providing 0.3 m (1 ft.) of service space for each 7.6 m (25 ft.) of residential space (i.e., 11,148 $m^2$ or 120,000 sq. ft. of office space would provide jobs for 350 persons)[8] provides a reasonable point of departure. Design teams are encouraged to discover and put forth a rationale for either more or less neighbourhood office space than this amount, in either dedicated office space or in combination live-work space.

**Services for the region.** Currently, there is a surplus of general office space in the areas of the downtown core, Main Street and the Broadway corridor (PS, 23). The desirability of creating complete mixed-use communities notwithstanding, the provision of additional general office capacity that is not specifically linked to neighbourhood needs should be approached with caution.

*Productive and creative life: industry*

**Jobs in industry.** The City is considering a job creation target for the SEFC of one job per household (PS, 51). This does not mean that one member of each household on the site should necessarily work there, only that there should be a balance struck between SEFC households and SEFC jobs. Assuming an average unit size of 93 $m^2$ (1,000 sq. ft.), we can expect 3,000 households on the city-owned portion of the site. A large number of the required job sites will be located on the blocks between 1st and 2nd avenues. This area is outside the charrette boundaries but is part of the larger SEFC planning area. Consequently, we ask charrette participants to begin their deliberations by assuming that the city-owned lands may provide job sites for about 1,000 persons. These jobs would be divided in some way between office, commercial or industrial occupations, with the remainder in live-work situations capitalizing on opportunities to provide flexible space at grade.

**Is it "industry" or "workshops"?** The City would like to know what industrial uses will support urban vitality in the urban centre of the SEFC. The PS recognizes that the distinction between office, commercial and many kinds of industrial or workshop activities is gradually eroding (PS, 25). For example, an artist's live-work space combines residential, commercial and industrial activities in one dwelling (PS, 25). This use has successfully enriched many neighbourhoods without provoking significant complaint. With this in mind, and for the purposes of this design charrette, we ask participants to consider the possible benefits of providing various types of small-scale industrial, or what might be more accurately called workshop space. Granville Island provides good working examples of small-scale manufacturing (e.g., kayaks) mixing with boat repair, hotels, community markets, glass blowers and, in what might be North America's most extreme example of truly mixed use, a concrete plant that regularly dispatches fully loaded concrete trucks through hordes of tourists. Since the design teams will be suggesting where such a centre (or centres) should be located, they should be able to add industrial/workshop uses to the new centre. It may be possible to justify the inclusion of "industrial" in the SEFC in a way that has not heretofore been considered (each additional 9,290 m$^2$ or 100,000 sq. ft. of industrial/studio/workshop space provided, would accommodate 300 new jobs on average).

**Bringing industry home?** These industrial/workshop functions may be housed in mixed commercial/residential buildings, if appropriate.

*Community living and community facilities*

**Community facilities requirements.** The SEFC site will be the social centre for its residents as well as for the residents of the adjacent community who are presently underserved with regard to schools, parks, day care and community centres. Current proposals call for the inclusion of a 3,252 m$^2$ (35,000 sq. ft.) school, a 2,323 m$^2$ (25,000 sq. ft.) community centre with appropriate outdoor activity areas, and 743 m$^2$ (8,000 sq. ft.) to accommodate 180 day care spaces (CL, 35). Day care spaces should be in four or more different locations, and some portion of the total may be provided in home-care settings. The City has begun the process of licensing home-care day care centres. The school and community centre may be in a separate building or buildings but may also be part of mixed-use buildings, provided they have direct access to both active and passive recreation spaces (PS, 28).

Can there be community life without community facilities? The proposed city policy, as expressed in both the USD and the PS, places special emphasis on accommodating community-building activities, spaces and facilities at the SEFC. The SEFC community should:

- provide spaces for many kinds of special cultural activities (USD, 38);
- create spaces that facilitate but do not force social interaction between residents (USD, 36);
- create streets whose most important function is to provide a place for people to interact (USD, 36);
- provide an urban structure that will enable residents to identify their neighbourhood as "home" and its centre as the "heart" of their collective social life (USD, 36);
- visibly demonstrate sustainable principles in as many buildings and spaces as possible (USD, 39; PS, 28);
- re-use heritage buildings and employ various means to explain the heritage of the site (USD, 39; PS, 28);
- integrate public art and artists at initial and all later stages of development (USD, 39; PS, 28); and
- provide ample opportunities for residents to participate meaningfully in the stewardship of their neighbourhood (USD, 36).

*Getting around*

**Streets for everything, but mostly for people.** The impact of the car should be kept to a minimum (PS, 8; USD, 12). Other modes of transportation should be given priority over cars in order to encourage residents to shift from auto dependence to walking, cycling or transit (USD, 22; PS, 9).

**Streets where people go and cars slow.** Streets should carry cars safely, but slowly (PS, 9). Wide streets encourage speed; narrow streets with ample "side friction" do not. Granville Island provides good examples of curbless streets where people and cars share space with little conflict. Non-through streets are particularly amenable to strategies that encourage both pedestrians and cars. Team members should feel free to suggest both precedented and original ideas for streets as well as for either combining or separating walking, cycling, trolley, other modes of transit and cars (PS, 9).

**Ease of access to public transit.** Locate residences within a three-to-four-minute walk (350 metres) of regular transit service (USD, 14).

**Extend the grid of the city.** Connect the SEFC and Fairview by extending all, or most, of Yukon, Alberta, Columbia, Manitoba, Ontario and Quebec streets into the site (PS, 9). These connections, while not primarily intended to serve the transportation needs of cars, may do so. However, they will definitely extend the public space corridors to False Creek, allow cyclists and pedestrians to see as well as to reach it from further south, preserve views and allow SEFC residents to easily walk or bike to the Broadway corridor (USD, 15).

**Create a high street.** 1st Avenue may become a commercial spine for the district. Suggest ways to create a pedestrian-oriented local service and commercial street (PS, 9). Circumstances may allow this local service and commercial street to occur north of 1st Avenue, presumably on one of the north-south streets entering the site or on an urban square.

**Locate a streetcar line.** A city-owned streetcar line will eventually link the site to SkyTrain, downtown, Granville Island and other parts of the south shore of False Creek (PS, 8). While the entry and exit points of this streetcar line are probably fixed, the alignment inside the site is not. Use this line as an element of your urban design.

**Streets as ecological infrastructure.** In the past, streets have been designed primarily for one purpose: moving cars. At best, they have been designed for two purposes: moving cars and pedestrians. Thinking sustainably forces us to maximize the utility of, and to integrate, all systems—street infrastructure in particular. In addition to moving cars, sustainable streets accommodate pedestrians, transit, bikes and goods. Sustainable streets also provide social space for informal interaction and larger gatherings, thus blurring the distinction between streets and parks. Finally, sustainable streets are elements of green infrastructure, moving and cleaning water while providing shade and habitat. And they do all this by costing less, not more, than do standard streets to install and maintain. Designers are encouraged to think of the roughly 20 per cent of the site devoted to these kinds of more sustainable streets.

*Safety and control*

**Eyes on the street.** Design public spaces to encourage their being observed by nearby residents (USD, 36).

**Active urban streets.** Promote the use of public streets for legitimate social, commercial and recreational activity reducing the tendency for public areas to attract illegitimate activity (USD, 36).

*The public green*

**Integration of landscape and cityscape.** Richly layering green into buildings, streets and infrastructure as well as into more sustainable parks increases habitat, reduces energy costs, cleans water and produces food for residents (USD, 22, 27, 28, 37; PS, 32, 42).

**Equal access to the shore.** Open access to the shoreline is a distinctive principal of Vancouver's recent and historic urban development. The equity aspects of sustainability make this principle particularly applicable at the SEFC. Link all parts of the site and neighbourhoods on the east, west and south of the site to the shore (PS, 7). The average width of the creekside walkway/bikeway should be 18 metres (60 feet). What happens in this 18 metres varies, but it often takes the form of a 10.7-metre (35-foot) wide travel way and a 7.6-metre (25-foot) wide buffer strip (PS, 7). Commercial functions (such as outdoor eating) may intrude into this strip. Variations and interruptions for ecological, cultural or special commercial reasons are encouraged (PS, 15). The shoreline should be designed with a variety of edge conditions that are accessible to all, and it should include a ferry stop (PS, 15). No marina or powerboats of any kind, except water ferries, are anticipated for this site (USD, 30).

### Building design and environmental performance

The goal of City of Vancouver public policy is to reduce the environmental impacts attributable to its buildings. A more sustainable community must include buildings that work with, not against, nature's cycles. Resource streams into the building area should be substantially reduced. Discharges, in the form of waste heat, waste materials and wastewater, should also be dramatically reduced. Charrette participants are challenged to consider the effects of reducing environmental inputs and outputs on building form and, consequently, on urban form.

*Are there especially sustainable building types?*

Are there particular building types that best respond to the myriad social, economic and environmental goals of sustainability theory (CL, 6; PS, 35)? Does the special and overarching policy objective of the SEFC (i.e., that it be sustainable) provide a reason for moving away from what has become the conventional Vancouver urban response—the 20- to 30-storey tower block on a wider and longer four-storey "pedestrian-and-street-scale" base? Could lower profile buildings with large roof gardens provide the same land use efficiencies and better meet the social and environmental objectives of the project? Or do environmental, economic and aesthetic arguments still make the "Vancouver Point Tower" the most sustainable building type for our special region? Or is the combined option used in many new developments the best choice, where the occasional highrise structure rises from the pedestal provided by the more extensive low-rise structures. Design teams are challenged to address this question in the full knowledge that this charrette provides a never-to-be-repeated opportunity to speculate on this question and to influence future city policy on this important matter.

*Is there such a thing as a building site that is too big? Too small?*

The City would like to see a finer-grain development for the SEFC than is found in other recent projects. What is the ideal building site size or range of individual building site sizes, for the SEFC? Do social, environmental and economic considerations influence this question? Should there be a more open attitude toward architectural style and building configuration on the individual building parcels? Individual blocks? Streets? To what extent should the site develop incrementally (USD, 16, 30)? How big should blocks be? How many parcels on a block? Stated another way, how many different architects or architectural firms should design buildings for the site? One? Four? Ten? One hundred? Depending on your answer to this question, how should the City subdivide the site to ensure this outcome?

*Building energy performance*

Buildings should be designed to cut total energy use to 285 kWh/m$^2$/yr (USD, 18), which is about half the norm. Peak electrical use should be cut further still in order to even out regional demands on energy infrastructure to 33 W/m$^2$ (USD, 17).

*Building energy from renewable sources*

At least five per cent of the energy used on site should come from on-site renewable sources such as solar voltaics, solar hot water (PS, 32) and geothermal energy. Dependence on the sun for even this relatively small proportion of the total energy need will have an important influence on building and urban form.

*Building/public realm relations*

Buildings should be designed to create clearly articulated street spaces, particularly on north-south streets, with as many frequently used doors and windows on the street as possible (PS, 33, 113). Buildings should allow the maximum amount of sun possible into public and semi-public open spaces. PS, 34. The Creekside Landing proposal roughly conforms to this pattern, which can be seen in the photograph of the model shown on the first inside page of the Creekside Landing Report.

*Building heights*

The City has assigned general height limits for the various portions of the site. These restrictions are intended to protect views and ensure that SEFC buildings are compatible with their urban context. Generally, the intent is to allow a maximum height of 91 metres (300 feet) at the southeast corner of the site; gradually lower heights to the existing 30.5 metres (100-foot) maximum on 2nd Avenue at about the midpoint of the site; lower them still more in the middle-north part of the site; and keep them low from the middle-north part of the site to the northwest corner. Soil problems are a major reason for restricting the middle-north to the northwest corner of the site to park use. A 20-metre-wide bridgehead zone along the east side of the Cambie Street Bridge would be precluded from building development. For an additional 15 metres, the maximum height of buildings would be restricted to four stories (PS, 36). Beyond that distance no special bridge-related considerations apply.

*Old views, emphasized views, new views*
Generally, existing views down north-south streets should be protected and enhanced (CL, 20). Creekside Landing consultants have also emphasized the importance of the view down 1st Avenue to the Science Centre (USD, 23). New views of the waterfront, the city skyline and the mountains are possible from many, if not all, parts of the site. Creation of these special views should be a high priority. However, if there is an irresolvable conflict between a sustainability objective and the desire to preserve a view, the sustainability concern will prevail.

## Cycles of growth and waste

*Clean water*
Current levels of per capita water use are close to exceeding Vancouver's water supply. Cut average residential consumption to as close to 130 litres per day per person if possible (PS, 42). Help achieve this reduction by capturing rainwater for use in flushing toilets and site irrigation. Ibid. Note: most water saving features will likely be located inside of structures and will likely not have a dramatic effect on SEFC urban design.

*Graywater*
Treat/use graywater on site wherever possible for irrigation and improved soil hydrology (USD, 25; PS, 44).

*Blackwater*
The efficacy and efficiency of the Greater Vancouver Regional District's (GVRD) sewage treatment system is marginal. Treatment is only "primary," and it does little more than separate solid from liquid waste. Unlike the newer communities that have separate systems for septic waste and stormwater, in Vancouver, septic waste flows through the same pipe as does rainwater. On rainy days, the delivery system is overtaxed, leading to discharges of virtually raw sewage into English Bay, False Creek, Still Creek, Burrard Inlet and the Fraser River. Receiving waters are coming under increasing stress from this inadequate system. The potential for small-scale, on-site disposal has been advanced by many as one possible long-term solution. There are systems that can completely treat wastes produced within a group of buildings or a single building, either from inside these structures, from adjacent open spaces or from rooftop gardens. Assume that 20 per cent of the blackwater flows generated would be treated on site through the use of solar aquatic or some other appropriate technology (PS, 44; USD, 11). Some amount of open space could be used for this purpose and could, conceivably, be combined with natural and habitat areas.

*Household waste*
Consider the creation of a centralized neighbourhood composting system (USD, 10). SEFC's overall target is to reduce solid waste going to landfills to 20 per cent of the per capita average for the city (USD, 22).

*Green waste*
All green waste material that is trimmed, mowed, clipped or falls to the surface should be returned to the soils of the site. USD, 22 (this is twice the Vancouver average, but only half the amount grown by the typical resident of Village Homes in Davis, California).

*Produce gardens*
Provide space and support for residents to grow 12.5 per cent of their yearly consumption of produce on site. This space may be located on rooftops, in semi-private areas and as part of public open space.

# APPENDIX C: PRODUCTS OF THE RESOURCE TEAM

The resource team produced several short discussion papers on a number of issues including:

- staged construction of adaptable buildings;
- transportation planning for SEFC; and
- cluster utility systems.

## Stage Construction for Adaptive Buildings

### Modular Infill

### Row Housing

Contractor 'A' only Builds Structure

Contractors B, C, D, And DIY (DIY means do it yourself) Build "Frontage," "Backage" And "Insideage"

- Flexibility
- Individuality
- Affordability
- Sweat equity opportunity.

**Target population?**

- Individuals who value environmentally sensitive development.
- Transit riders, especially the elderly and students.
- People who work close by.
- People with lower incomes who can't afford cars.
- Those who enjoy the exercise of walking to work and shopping.
- Children and teenagers.
- Lone-parent families or families with young children.

## Transportation Planning for SEFC

### Sustainable Assumptions for Vehicles

| | Electrical | | Hybrid | | Shared Ownership | |
|---|---|---|---|---|---|---|
| | Average | SEFC | Average | SEFC | Average | SEFC |
| 2002 | 3% | 50% | 3% | 10% | 5% | 100% |
| 2006 | 10% | 60% | 20% | 30% | 20% | 100% |
| 2010 | 25% | 60% | 50% | 40% | 50% | 100% |

### Promoting Sustainable Movement

| | Bicycles | | Bikes and Blades Motorized | | Public Transit | | Walking | |
|---|---|---|---|---|---|---|---|---|
| | Average | SEFC | Average | SEFC | Average* | SEFC | Average | SEFC |
| 2002 | | 40% | | 5% | 15% | 100% | | |
| 2006 | | 50% | | | | | | |
| 2010 | | 50% | | | | | | |

1998* Average for Vancouver proper 17% (morning)
Average for Vancouver region 12%

- Activity centres which are easy to walk to and have frequent and varied activities (e.g., school, market daytime, cultural and sports evening).
- SEFC community to plan and carry out its own support and activities.

## Cluster Utility Systems

Cluster utility systems (CUS) are a method of supplying infrastructure services to the buildings in a neighbourhood by clustering the infrastructure systems into nodal buildings throughout a neighbourhood. These cluster utility buildings (CUBs) receive primary service supply lines and then redistribute it to buildings within a certain radius. The buildings become the focus for waste lines from the buildings and then deal with the waste or redirect it back into the main city infrastructure grid.

### Services Included in a CUS/CUB

Services in a CUS and in a CUB include:

- electricity;
- gas;
- water;
- low-grade heat (hydronic system or district heating system); and
- communication lines.

*Merits*

Cluster utility systems have many merits.

- The scale of system can be matched to scale of development, overcoming a financial challenge with typical district heating systems.

- The system physically removes from property owners the nervousness of adopting innovative technology.

- CUSs can be established on a BOO (Build, Own, Operate) or BOOT (Build, Own, Operate, Transfer) basis.

- The CUS building, contents, operation, maintenance and upgrade can be handled by a utility services company. It can be capitalized by such a company, not the developer.

- A CUS would be easier to upgrade to new more environmentally benign technology than in the case where all equipment is located in each dwelling.

- All the proposed systems are technically proven but product development and market development are growing rapidly so lower costs of equipment can be expected in three to four years—the estimated time before first construction.

- This system has many water-related merits including:
  - lower water consumption by at least 80 per cent;
  - effluent is so benign there is no health hazard associated with on-site discharge;
  - minimum water supply infrastructure costs;
  - no municipal wastewater treatment infrastructure required; and
  - solid waste from the wastewater treatment system could be trucked away once per year and used as fertilizer.

- High efficiency and renewable energy systems are easier to install and manage including:
  - electricity/low-grade heat supply;
  - micro-co-generation: fuel cells, small-scale gar turbine, Stirling engines;
  - heat pumps: heating and cooling possible from False Creek or swales penetrating the property from the Creek; and
  - nearby industry could possibly make available hydrogen for fuel cells as well as storable energy to meet peak heating demands and some baseload.

The authors are confident that the concepts described above are, in principle, fully compatible with currently emerging concepts for the design of community energy systems but would, of course, need to be carefully evaluated and engineered.

## Matching Planning Detail to Development Phases (Assuming 3 Phases of Development)

| 2002 | 2006 | 2006 |
|---|---|---|
| 1st Phase | 2nd Phase | 3rd Phase |
| Specific | Alterable Options | Concepts only |

## Cluster Utility System

Concept: To capitalize on current advantages on site

- water and waste water treatment;
- cluster scale energy system;
- micro-co-generation; and
- geo/water thermal heat pumps.

# APPENDIX D: THE HISTORY OF SOUTHEAST FALSE CREEK

This overview focusses on the lands between Cambie and Main streets, from False Creek to 2nd Avenue. This site has undergone tremendous change in just over a century, and already has a rich and varied history.

The original head of land that projected into False Creek perfectly straddled the west and east sides of Vancouver, being symmetrically centred on the north-south zero point of Vancouver's street system that originated at Gassy Jack's saloon in Gastown. This great dividing line in Vancouver, known as Carrall Street north of False Creek, becomes Ontario Street to the south. Our site, Southeast False Creek, is the only neighbourhood in the city to straddle what are usually called the city's west and east sides.

## 1850s: The End of an Era Lasting 10,000 Years

People have been living in the Lower Mainland for a very long time—since shortly after the last ice age ended almost 11,000 years ago. On Burrard Inlet in the 1890s, an old Squamish Native elder began his traditional recitation of the history of the Squamish nation with the words "In the beginning, there was water everywhere...," a reference to "the flood" here at the end of the last ice age. Not far from Vancouver are village sites almost 10,000 years old.

Southeast False Creek was originally covered with a thick forest of fir, cedar, hemlock, spruce and salal, and in the marshy land near the shoreline was a dense growth of crabapple bushes. The waters off the large tidal beach area were home to sole, perch, sturgeon and a variety of waterfowl, while elk, deer, bear and beaver were at home on the land. All these resources were traditionally used by local Native peoples in a myriad of ways.

An ancient trail ran near the shoreline and joined another following a route that later evolved into Main Street, but no Native village sites are presently recorded. Nearby, there are two village sites on False Creek and others known to have been inhabited at least 2,000 to 3,000 years ago. Thus, Southeast False Creek would have been frequented by First Nations peoples for at least 3,000 years, and likely for about 10,000 years. The area is a part of the territory traditionally used by the Musqueam, Squamish and Tsleil'waututh peoples.

Our oldest recorded story of the area comes from Pauline Johnson's Legends of Vancouver, where she recounts a story about Old Chief Capilano harpooning a giant seal near the entrance of False Creek about 1820. He was pursuing it by the shores of Southeast False Creek when it dove out of sight just before reaching Khiwha'esks, where Main Street is now located.

## 1860s: The First Non-Native Settler

In 1867, Julius Voight pre-empted District Lot (DL) 200A, 180 acres that includes most of the present Southeast False Creek site. He built the first cabin in the area near present day Main Street and 1st Avenue. He was one of the first non-Native settlers in Vancouver and, according to current knowledge, the only person living in Southeast False Creek in the 1860s.

## 1880s: First Land Development

Most of Southeast False Creek was first subdivided into streets by Israel Powell in 1888, the year Mount Pleasant was named by H.V. Edmonds, a former owner of DL 200A. Powell was one of the chief proponents of colonial British Columbia's 1871 entry into Canada, and his naming of the streets in DL 200A was done as a symbolic representation of the whole of Canada.

He named the streets from west to east, in order, after the Canadian provinces in 1888: [British] Columbia Street, Manitoba Street, Ontario Street, Quebec Street, [Nova] Scotia Street, [New] Brunswick Street and Prince Edward [Island] Street. Later, after the Yukon and Alberta joined Canada in 1898 and 1905, respectively, these streets were added. Saskatchewan Street and Newfoundland Street have yet to be added.

The east-west streets he named numerically and after the governors-general of Canada. For example, 4th Avenue was named Lansdowne Street after the fourth governor general of Canada after British Columbia joined Confederation. It is also interesting to note that the Province of Ontario is known as Central Canada and, in Powell's naming system, the central point of Vancouver's street system (zero hundred block) occurs at Ontario Street, with the western province streets to the west and the eastern province streets to the east.

## 1890s: Mount Pleasant Developed

In 1886, the City of Vancouver came into being as the construction of the Canadian Pacific Railroad across Canada heralded the rapid growth of the designated western terminus on Burrard Inlet. In the 1890s, residential development first spilled south over False Creek, creating the city's first suburb, Mount Pleasant, but its shoreline was still not yet built upon.

## 1900s: Sawmills and Shingle Mills

In this decade, False Creek really became lined with sawmills and shingle mills—eventually 17 sawmills employing 10,000 workers. Mount Pleasant filled with houses to 1st Avenue, with large sawmills/lumberyards and construction industries taking up the waterfront. In 1909, from west to east, the large waterfront plants were the W.F. Hutting Lumber Co., Dominion Glazed Cement Pipe Co., Prudential Builders Sectional House Factory, Western Gravel Co., W.W. Stuart Lumber Co., the Vancouver Clear Cedar Mill Co. and the City Market at Main Street.

## 1910s: The Great War

The Vancouver City Yard relocated to the shore just east of the Cambie Street Bridge and an incinerator was built there in 1910. Most jobs in these pre-automobile days were in the industrial plants inside the Fairview Beltline streetcar route that circled False Creek. (Note: today a rail line currently passes along the edge of Southeast False Creek's 1st Avenue and, recently, an old streetcar has been operating on the section west of Cambie Street.)

During World War I, the city block at the foot of Columbia Street (the Canron site) was home to Coughlan's Shipyard, where a large contract to build 8,800 ton naval ships made the company Vancouver's largest employer in 1918. Here, 2,000 Vancouverites fought the war on the home front, toiling amid great noise and smoke to produce the largest tonnage of steel ships in the British Empire.

In 1918, at 95 East 2nd, Columbia Block and Tool constructed a typical new metalworking facility out of heavy first-growth fir columns and beams (now called the Opsal Steel Building). This building, with its interesting Moderne addition next door, used to be an "A" building on the City's heritage inventory and is a good example of the facilities that sprang up on False Creek to service the equipment needs of the forest industry. The 1919 Maynards Auctioneers Building at 365 W. 2nd Avenue/1920 Wylie Street is an example of a postwar brick warehouse from this period, and is currently a "B" building on the City's heritage inventory.

## 1920s: Postwar Years

A number of new wood and coal yards appeared along the Southeast False Creek shore, while the sawmills and metalworking industries thrived. In 1924, the B.C. Telephone Company built a four-storey brick warehouse at 380 W. 1st/1955 Wylie Street (the local short streets Wylie, Crowe and Cook were all renamed in 1925 after early Vancouver aldermen). The warehouse is currently known as the Best Cleaners Building and is a "B" building on the City's heritage inventory. Coughlan's large facility burned to the ground and its wharf wasn't rebuilt until World War II.

### 1930s: The Great Depression

Despite the Depression, Southeast False Creek was the site of significant new activity in the 1930s. In 1931, the Vancouver Salt Company constructed a new building at the foot of Manitoba Street. *Today this building is the only building expected to be retained on all the city-owned land north of 1st Avenue.*

In 1935, the Hamilton Bridge Company constructed a huge new steel fabrication plant at the former site of Coughlan's Shipyard. This 1.2 hectare (three-acre) plant later became known as the Canron Building. Some of the first jobs done here were the fabrication of the steel for the 1st Avenue Viaduct, the Patullo Bridge and the towers of the Lions Gate Bridge.

### 1940s: World War II

During World War II, 2,000 steelworkers laboured inside the Canron Building, then known as Western Bridge, fabricating large sections of 10,000 ton freighters to replace the ships sunk by German U-boats in the North Atlantic. Just outside the building 3,000 shipbuilders working for Westcoast Shipbuilders assembled and launched a total of 55 of these 10,000 ton freighters in just four years. Westcoast Shipbuilders and Western Bridge were also the site of giant Victory Bond rallies where stars, such as Susan Hayward, Barbara Stanwyck, Jack Benny and Rochester, came to entertain thousands of workers and cajole them into buying war bonds.

On the site immediately to the east, the Sitka Spruce Lumber Company took prime Queen Charlotte Island spruce and milled it into structural members for WWII aircraft.

In the war years, the Industrial Age peaked in Vancouver's False Creek as 5,000 union workers laboured at the Canron site alone. Thousands of others at over a dozen sawmills cranked out materials for the war effort, and smaller machine shops, foundries and manufacturers of industrial equipment filled the spaces between.

In these years, women entered the industrial labour force in large numbers for the first time and union membership soared, increasing 10 fold in the forest industry alone.

### 1950s: Postwar Years

The main plants along the Southeast False Creek shore, from west to east, were the city yard, Dominion Bridge, Western Bridge (later Canron) Steel Fabricating, Sauder Lumber Company, Vancouver Salt Company and Ruskin Cedar Products.

### 1960s-1980s: Industrial Decline

In the 1960s, industry began to leave False Creek and not be replaced. In 1970, city council decided to rezone much of False Creek for housing and parks. In the 1980s, Expo '86 became the reason to clear all industry from the north shore of False Creek.

Meanwhile, in Southeast False Creek, workers in the Canron Building were fabricating steel for sites all over the world, as well as for downtown Vancouver highrises, the Alex Fraser Bridge, West Edmonton Mall, Canada Place, Seattle's Husky Stadium and for the largest free-standing building in the world, the Boeing plant in Everett, Washington.

### 1990s: The Present Decade

The industries of Southeast False Creek held on until 1990, when Canron moved out of the Canron Building. This huge historic building was torn down in 1998. The end of the 1990s presents an almost blank slate at Southeast False Creek north of 1st Avenue—a site that soon will be as vacant as it was at the end of the 1890s.

## 2000s: What Can Be Used to Represent This Past?

### The Vancouver Salt Building (1931), 85 W. 1st Avenue

This interesting 1,486 m$^2$ (16,000 sq. ft.) wooden building (the Domtar Building) with wooden roof trusses was originally built on piles over False Creek. Today, it is still facing 1st Avenue, and it is still sitting on piles over water, even though years of filling in False Creek have left it quite a distance from the shore. The Vancouver Salt Company refined and stored most of the salt shipped into Vancouver to be used in the fishing industry for canning and refrigeration, in cold storage and tanning plants, and by food packers.

## City Works Yard Buildings, 315 W. 1st Avenue

There are two interesting one-story buildings off 1st Avenue, just inside the entrance to the city works yard, that could serve as part of a low-rise entry area to the west end of the Southeast False Creek site. On your left as you drive into the yard is an old brick car and truck storage building, c.1920, with arched windows and two large double sliding doors. Next on your left is the central machine shop, c.1920, which features, running the length of the building, a classic sloping roof/skylight and the original overhead belt drive shaft.

## Remnants of the 1935 Western Bridge (Canron) Plant, 195 W. 1st Avenue

In 1998, city council authorized the spending of $100,000 to set aside representative pieces of the Canron Building as a historical legacy for use in the Southeast False Creek redevelopment. One of the 50-ton overhead gantry cranes (the single most important piece of equipment in the building) and four A-frames used for supporting the two tracks on which it moved were saved, as well as a few steel columns that might be used in some way to mark the footprint of the building. They are currently stored at the old Canron site by the water at the foot of Columbia Street.

At least two of the people who helped select the pieces of the building suggested the 1st Avenue side of the Canron site would be the best place to reinstall the pieces, on the footprint of the old building. The old rail line currently being used by a restored streetcar passes by there. This could be one way to begin to commemorate Vancouver's industrial heyday, when False Creek was the throbbing and smoldering heart of the city.

# APPENDIX E: RECOMMENDATIONS FOR PLANNING FUTURE CHARRETTES

## Charrettes Need Resources

Charrettes can be time consuming and costly if you want a good product. They involve preparatory time, fees for all participants, materials, location rental, catering and final printing and report production costs. Trying to cut corners never works. If you can't afford to do a charrette, find another tool, such as a short design workshop on a key issue or a consultancy to address development and policy challenges.

## Communication

- Do a comprehensive communication plan, outlining timing, information flow, information packages, etc... and follow it.
- Develop a media/public package, even a rough one, for wide distribution following the charrette.
- Hold presentations of the charrette after its completion. Allow the charrette teams to speak about their work, because city staff will tend to edit many things because of their bureaucratic/politicization sensibilities. The participants will, on the other hand, tend to tell it like it is and get many important, but politicized, issues out on the table for discussion.
- Choose participants with credibility, especially for the presentations! Charrettes on sustainable design bring up all sorts of new issues and, if decision makers hear these ideas coming from people they trust, they take it seriously.

## Charrette Development and Choreography

- Hire experienced consultants to set up the charrette. It is important for many reasons. It will run smoother than if city staff manage it, and it will be seen as more credible. It is important to build a strong relationship with your charrette choreographers. They are the key to the event. Hire people who have run charrettes before. Charrettes are strange events and only experienced people know how to manage them.
- Selection of team members can be difficult as many will be qualified, but only a few can be chosen. Develop strong criteria to help you chose and communicate clearly to a wide body of interested or qualified professionals, your intentions and choices and rationale. Charrettes are used for many purposes in the development field and there are accepted ways of choosing participants. If your charrette is not to be in the usual format, as used by the architecture profession, then provide a clear explanation on its nature and process.
- Be very clear on what you are asking the charrette teams to do. Confusion will result in frustration and the results will be less useful for you. If the instructions are unclear and the teams produce work that is not useful to you, not only have you wasted resources, the participants will feel let down.

## Logistics

- Hold the charrette on a weekend or another generally slow time for the design professions. Weekdays are key working times for professionals and often charrettes don't pay as well as regular billing rates.

- Create an easy legal contract/invoice system for participants. The paper trail of several dozen contracts and invoices can get a bit crazy in the time frame of the charrette.

- Have as much help/staff as possible on call at all times to help the charrette managers. During the process, teams always need new supplies. Getting the supplies or information or resource people should not interupt the charrette manager's work and, thereby, the charrette itself.

- Arrange for extra help in taking down and setting up at the location of the charrette. Your charrette manager and key logistics people will be exhausted before the charrette begins and even more so after the charrette. A few extra hands ensure a comprehensive and smooth set-up/take-down process. This extra help is only needed for a few hours at each end.

- Have ample food available at all times for all participants. Do not cut corners on the catering. A reliable supply of good food is a prerequisite for people who have to think creatively for 48 hours. Ensure there is plenty of food for vegetarians.

- Order an excess of supplies (trace paper, pens, vellum, etc...), but arrange to have what is not used, returnable. Most charrette supplies are not used in great quantities by the hosting organization and some supplies can be quite expensive.

## Products

- Arrange for final drawings from the charrette, to be mounted, photographed and printed immediately. Many requests to see them will come within the few days after the charrette.

- Develop a summary package of charrette outcomes or products immediately (even just a draft) for distribution to all key stakeholders, especially senior decision makers overseeing the project.

- Plan to publish a report with nice graphics as soon as possible for wider distribution.

- Ensure appropriate decision makers have a chance to discuss the outcomes, recommendations and implications shortly after the charrette, as discussions will spread on the charrette recommendations, and city staff will need to be able to take an informed position during those discussions.

# APPENDIX F: CMHC RESEARCH REPORTS RELATED TO THE ENVIRONMENT

## WATER CONSERVATION

**Residential Water Use Model** (1997)
This project develops a user-friendly computer model that determines daily water consumption for a prescribed pattern of water use in a house that incorporates facilities to treat and reuse gray water. The program will be of value to designers of innovative residential plumbing systems. Its first application was in the design of the water system for the Toronto Healthy House and the Conservation Co-op apartment building in Ottawa. The system has been configured as an interactive exhibit.

**Mult-Residential Water Efficiency Study** (ongoing)
This research documents water savings associated with water efficient pluming fixture replacements in a multi-residential case study, and analyses prospects for the adoption of water efficient technologies in multi-residential buildings.

**Water Recycling Demonstration** (ongoing)
This demonstration of graywater reuse is being undertaken in partnership with a municipal government and housing co-op. Eight units in the new Conservation Co-op apartment building in Ottawa will be connected to a small water recycling plant. Washing water will be treated and used for toilet flushing. Four conveniently-plumbed units will also be monitored as a control. Monitoring of water consumption and quality before any changes are made to the system is now underway.

**Innovation in On-Site Wastewater Treatment** (ongoing)
The project is studying the impacts of residential water conservation on groundwater quality, and will particularly address the issue of nitrates in groundwater. The test site is a new occupied rental unit. It contains code-approved water-conserving fixtures and a novel on-site wastewater treatment system. A monitoring program is in place to determine the impact of the reduced water flow on the baseline ground water quality. An extension of the project is anticipated to increase the level of recycling of effluent in the Biofilter.

## ENERGY CONSERVATION -HOUSE

**Aquifer Thermal Energy Storage** (ongoing)
An aquifer, a natural groundwater bearing layer, may be used to provide the thermal energy requirements of a building during heating and cooling season. Such storage can significantly reduce the amount of purchased energy required. This partnership project with Environment Canada is developing promising approaches form improving the reliability of Aquifer Thermal Energy Storage (ATES), developing ways to characterize and assess the potential performance and impact of ATES and identifying opportunities for demonstration of ATES in the housing sector. At a pilot plant in Truro, N.S., tests are underway to determine the degree of scaling of heat exchanger equipment water treatments required to collect or reduce calcium carbonate levels of the water before the equipment is affected are currently being studied.

**Energy Audits of High-rise Residential Buildings** (ongoing)
This project will determine the total energy gain and losses for ten high-rise building in St. John's, Ottawa, Montreal, Winnipeg and Victoria. The buildings are chosen from those that have been surveyed in a previous project that investigated air movement, air leakage, and indoor air quality. The project will assist in developing understanding of the poor energy performance of high-rise residential stock and in identifying opportunities for retrofit.

**Field Investigation of Energy Usage and the Indoor Environment in Mid-rise Residential Buildings** (ongoing)
An investigation of the energy consumption patterns and indoor air quality is underway in eight mid-rise residential buildings. The intent of the project is to identify problem areas in the energy consumption patterns and indoor environment of this form of housing and to recommend improvements and future research priorities.

**Wood-fired Heat and Power Generation** (ongoing)
Wood-fired appliances that provide space heating, water heating and electricity generation would be useful in remote areas where electrical service is expensive or vulnerable and wood is readily available. This project is investigating the availability and market potential of this equipment.

**Environmental Impact Study: Residential Retrofit Potential in Canada** (1997)
Methods for improving the energy efficiency and durability of low-rise wood frame walls have been developed and evaluated using the CMHC Statistically Representative Housing Database (STAR). The durability of the retrofit measures was also confirmed using EMPTIED, a building envelope simulation program. This research concluded that whole house retrofits are necessary to have an appreciable impact on energy consumption and greenhouse gas generation. However, given the present cost of fuel, these are not economically viable for most homeowners. Retrofit incentive programs, increased fuel costs or the imposition of a "carbon" tax may stimulate retrofit activity.

**Nouveau Confort (Energy Efficient Housing) Curriculum** (1997)
CMHC worked with Hydro-Quebec on the creation of training materials and their pilot delivery to builders, designers and others in the Quebec residential construction sector. The training materials represent the latest developments in energy efficiency and building science and also include segments on low toxic construction (Healthy Housing). These materials were utilized in November 1995 within the context of Quebec-Hydro's Maison Efficace program, aimed at encouraging builders to construct thousands of energy efficient homes across the province.

**Passive Solar Techniques for Canadian Houses** (1997)
The only Canadian reference on passive solar design has been updated and enhanced to include advances in systems and components and to reflect a better understanding of the design issues. A final report has been produced and will be published as an advisory document.

**Home Energy Retrofit in Canada: Overview and Opportunities NRCan, CMHC, Le Ministère des ressources naturelles du Québec, Ontario Ministry of Environment and Energy** (1994)
This background study to the 'Retrofit Options Workshop', assesses the needs and opportunities of the Canadian market and key stakeholders, in terms of energy retrofits in the existing residential market. It also provides an overview of past and present retrofit initiatives and identifies and evaluates options for increasing energy retrofit activity. Existing data was assembled on the Canadian housing stock and profiles of consumer attitudes were developed and existing programs and studies were reviewed. Key stakeholders were interviewed and a list of initiatives for consideration by workshop participants was developed. The report includes the results of the workshop deliberations and recommendations.

**Energy and Power Needs and Availability in Housing** (1993)
This study takes a new look at the complex area of housing energy needs and use. It attempts to estimate the amount and type of energy needed to provide a variety of household services and estimates the thermodynamic efficiency of the devices that are currently used to meet these needs. The principal finding indicates that the energy requirements of most household services are extremely low and the thermodynamic efficiency of household devices is often well below 10%. The study concludes that there is room for significant improvement in household

devices through reduction of conversion losses; increased use of on-site heat recovery and ambient energy; better design to match household needs; and better matching of energy-source quality to need.

**Efficient and Effective Residential Air Handling Devices** (1993)
This study examined the efficiencies of residential ventilation and furnace fans. The scope included a detailed review of motor and motor control technology, fan design issues, and an international search of motor/fan combinations of conventional and higher efficiency.

**Barriers to the Use of Energy Efficient Residential Ventilation Devices: A Survey of Industry Opinion and A Review of Strategies for Change** (1992)
This report documents what key stakeholders consider to be the barriers to the availability and use of more energy-efficient residential ventilation devices and indicates what various actors can do to improve the situation. Industry opinion was sampled and delivered to 31 individuals. Four research projects are proposed: monitoring systems usage in-situ; lifetime testing; optimizing furnace blower system designs; and developing a portable fan test rig.

**Rationalization of House Energy Systems** (1992)
The primary objective of this study was to determine, through the analysis of household energy use and the assessment of a variety of integrated systems, what options make sense in the rationalization of house energy use. The water-loop system was used as a convenient means of integrating household energy systems within the DOE-2-ID program. A list of energy system options was generated and software models were added to accommodate most of these within the program. Options were evaluated individually as components and in combination as systems. Each system was simulated in each house type in three Canadian cities selected for their diverse climates.

## LIFE-CYCLE IMPACTS

**Optimize: A Method for Estimating the Life-cycle Energy and Environmental Impact of a House** (1997)
This computer program assists in calculating the life-cycle energy requirements of a house. The program has been revised to improve the instructions and user interface, and to increase overall speed.

**Energy Related Environmental Impact of Buildings** (ongoing)
This three-year project, scheduled to end in 1999, is an International Energy Agency (IEA) activity in which 14 countries are collaborating in the development of life-cycle energy modeling. Information will be compiled and published on the methodology and life-cycle environmental impact data. Emphasis will be given to the comparison of embodied energy data. Examples will be developed of how methods may be applied to different building types.

**Integrated Resource Planning and Full Cost Accounting of Housing** (1996)
This report outlines existing tools and methods for conducting integrated resource planning (IRP) and full cost accounting at the community level. A conceptual framework for community IRP is presented, which uses archetyping to cope with the complexity and quantity of data for the built environment. It also incorporates an end use model of the community components, and uses existing software to generate accurate modeling data on the performance of buildings, vehicles, and infrastructure archetypes. Using an archetype from Surrey, B.C., an example is included for the use of the software modeling tool to generate accurate and detailed data of resource consumption over the life-cycle of the housing, at various physical scales.

**Review and Market Needs Evaluation for the CMHC Life-cycle Costing Software** (1994)
This study performs a critical review of software that provides energy performance and costing information at the same time. CMHC developed a Life-cycle Costing software for this purpose. The study also performs a market survey to identify the commercial opportunities of the software.

## HEALTHY HOUSING

**Regulatory Obstacles to the Development of Healthy Housing** (1998)
Industry innovators report constant frustration and delays when attempting to implement new environmental technology in demonstration or leading edge innovative housing. Many of these impediments come from the regulatory process either through the relevant building code or various planning or zoning regulation. Innovative buildings, almost by definition, are likely to violate code requirements or zoning regulations. The purpose of this study would be to document various problems and to supply builders with the information on the types of regulatory problems likely to be encountered and the types of solutions that have worked in other circumstances.

**Healthy Housing Design Competition - Demonstration of Winning Designs** (1996)
Recognizing the effect of housing on the environment, CMHC held a national design competition in 1993 to stimulate industry to develop a new approach to housing design. The competition resulted in two winning designs: one in Toronto and the other in Vancouver. CMHC provided assistance to build, display and monitor the performance of the second winning houses from the Healthy Housing Design Competition. A Toronto developer built this three-bedroom family home on a small downtown lot in Metro Toronto, independent of city water, sewer, hydro and natural gas (construction was completed in October 1996). The house is autonomous, in that it meets all of its own water, power, heating and sewage needs through photovoltaics, passive solar heating, on-site wastewater treatment and collection of stormwater on-site. Fixtures and appliances were selected for low energy and water requirements. Building products with recycled content and low-embodied energy were selected.

The four-storey, semi-detached, 161 m$^2$ house is located on a back lane in an established neighbourhood in downtown Toronto. Because the house requires no hydro, water or sewer connections, it was possible to build on a 6.9 x 21.8 m lot that normally would be too expensive to develop. This house demonstrates housing choices that are do-able and affordable today. These housing choices can apply to both new and renovated homes, and even to rental accommodation.

**Healthy House in Toronto Brochure** (1996)
A fold-out brochure on CMHC's Healthy House in Toronto provides information on Healthy Housing and this award winning project. The poster size cut-away drawing of the House details some of the interesting aspects of this project.

**Healthy House in Toronto Product Listing** (1996)
CMHC's Healthy House in Toronto demonstrates many products, systems and Canadian expertise in design. The product listing for this project includes a brief statement, contact name, company, address, telephone and fax number.

**Healthy House in Toronto Website** (1996-)
By exploring CMHC's Healthy House in Toronto website you can discover significant details about the project and view the schematics on the water and electrical systems. Sponsors of the project are identified and Healthy Housing practical tips are given.

**Healthy Housing Practical Tips** (1994)
This consumer-oriented brochure describes five key elements of the Healthy House and what you can do to make your home better for the environment and more comfortable for you. It also looks at the sustainable community as a model of development that harmonizes the needs of people and the environment.

**Healthy Housing: A Guide to a Sustainable Future** (1993)
This publication is meant to raise awareness of the issues that affect healthy housing, of what is currently being done to further healthy housing, and of what can be done in the future. Healthy Housing: uses energy and resources efficiently, minimizes construction waste and domestic waste, makes optimal use of infrastructure, takes maximum advantage of environmentally benign materials, is readily adaptable to meet changing needs and lifestyles and is affordable.

**Healthy Housing Factsheets** (1997)
A series of nine factsheets have been produced to help consumers make their Healthy Housing choices for their house construction/renovation projects. The one page factsheets illustrate and highlight Healthy Housing features which can be included in their homes, according to five principles: occupant health, energy efficiency, resource efficiency, environmental responsibility and affordability. The factsheets are: kitchens, bathrooms, interiors, additions, exteriors, basements, mechanical, attics and landscapes. These factsheets were intended for use at the Renovation Demonstration 1996 projects during 'open houses' and other related events. They will also be included in future Healthy Housing advisory document. They will soon be available on the CMHC Healthy House Website.

## COMPACT URBAN FORM

**Increasing Urban Densities to Accommodate Population Growth** (ongoing)
This research will identify barriers to implementation and practical ways to increase densities in existing urban areas. It will examine recent population trends, existing built form and land consumption patterns, housing types and densities and infrastructure for a selected major urban area in southern Ontario. Twenty year alternative growth scenarios will be projected and analyzed to show changes in the built form, land consumption, infrastructure requirements, public faculties, housing distribution and urban density. Incentives and penalties which have been or can be used to promote densification and discourages sprawl will be examined. Guidelines and illustrations to help communities and public officials understand and resolve densification issues will be the product.

**Multifamily Housing for Community Sustainability** (ongoing)
This project will develop information to assist developers and municipalities in developing land at higher than current average densities by means of multiple housing forms. It will assemble and develop exemplary multiple housing solutions and assess consumer demand for these. This is a collaborative project with the Regional Municipality of Ottawa Carleton and NRCan both of which have a strong interest in community sustainability.

**Conventional and Alternative Development Patterns: Phase I- Infrastructure Costs** (1997)
The study assesses and compares the municipal infrastructure costs associated with two development patterns: a) a conventional suburban pattern and ii) a mixed-use, more compact patterns, planned according to the principles of New Urbanism. The test site is a large neighborhood in the community of Barrhaven, Ontario. The analysis considers the long-term "life-cycle" costs, including emplacement, replacement, operating and maintenance costs over a 75 year period, of linear infrastructure and community services, including, water distribution, sewers, schools and parks. The second phase of this study examines the revenue potential and the net costs to the municipality.

**Conventional and Alternative Development Patterns: Phase II- Revenue Potential** (1997)
The study assesses and compares the revenue potential and overall cost-effectiveness (in conjunction with Phase I: Infrastructure Costs) associated with two development patterns: a) a conventional suburban pattern and ii) a mixed-use, more compact patterns, planned according to the principles of New Urbanism. The analysis considers the long-term "life-cycle" revenues, over a 75 year period, of various linear infrastructure and community services. The revenue analysis is combined with the analysis from the infrastructure costs study, to calculate the net costs to the municipality associated with the type development patterns.

**The Integrated Community: A Study of Alternative Development Standards** (1996)
The integrated community is a study of alternative development standards (ADS) being implemented in many North America communities. These lead to developments that are more affordable, discourage urban sprawl, protect the environment, reduce dependence on the automobile, encourage public transportation and are more livable. This

study examines four case studies, and establishes a set of principles and guidelines for implementing ADS. The study demonstrates these principles through a hypothetical community concept called the integrated community.

**The Grass Roots: The Role of Tenure in Community and Sustainability** (1993)
To explore the potential of the neighbourhood as a focus of community, a study was undertaken involving 435 townhouse residents in Ottawa-Carleton. As a middle density form, one which is widely seen as a way of achieving a more sustainable urban structure, townhouses provide the opportunity to explore attitudes of people already experiencing this vision of a future, more dense, residential environment to measure their levels of satisfaction, neighbourhood commitment and participation.

**Resettling Cities: Canadian Residential Intensification Initiatives** (1993)
This study reviews the literature on the pros and cons of intensification. The literature reveals that for every argument that supports intensification there is a counter argument that repudiates it. The study presents intensification policies and initiatives, based on a national survey of municipalities, and presents detailed case studies of selected intensification initiatives. The survey and case studies reveal a significant planning policy shift in how urban land is used in Canada.

**Reconsidering the Dream: Towards a Morphology for Mixed Density Block Structure in Suburbia.** (1992)
This study includes a literature review and analysis of the suburban planning model and its ability to respond to the needs and aspirations of a majority of the population. An alternative approach was developed in response. It reintroduces a grid pattern, incorporates narrower street right of ways and proposes a dynamic lot pattern in which lots can be readily subdivided into a number of variants based on four quadrants. These different lot configurations would accommodate a range of dwelling types varying from large single-detached to smaller town homes as well as accessory apartments and accessory home-based offices. A simplified regulatory framework would allow builders and owners to adapt to evolving demographic and market circumstances.

## SUSTAINABLE COMMUNITIES

**Strategy for Consumer Information on Sustainable Community Planning** (1999)
This study examines consumers' information needs and their response to five potential information products on sustainable community planning. After conducting focus groups with consumers and interviews with potential partners, a strategy for the research, production, marketing and distribution of future products directed at consumers was developed.

**Planning Sustainable Communities** (2000)
This study is an updated advisory document on community planning and design, reflecting the latest thinking in the field. While the document will cover background issues, it will primarily address practical concerns, focusing on best practices and case studies. It will address issues such as fiscal restraint at all levels of government, changing demographics and housing needs, increases in traffic-related pollution and congestion, and a heightened sense of public awareness that "conventional" development patterns are threatening the environment and quality of life.

**Living by Water Guidebook** (ongoing)
This consumer-oriented guidebook will assist residents adjacent to watercourses in protecting shoreline habitat.

**Changing Values, Changing Communities: A Guide to the Development of Healthy Sustainable Communities** (1997)
This guide examines four alternative planning approaches which have emerged in response to concerns about the livability and sustainability of our communities; they are neo-traditional planning, the pedestrian pocket, cohousing and the eco-village concept. The guide is intended to aid readers in evaluating these approaches in terms of how they contribute to the development of healthy, sustainable communities. It provides

an evaluative framework which defines the essential attributes of a healthy, sustainable community identifies related planning goals and objectives, and identifies some of the tools which communities may use to meet their goals. The guide also presents nine case studies which exemplify the four approaches and reviews them to illustrate how the evaluative framework may be applied. The case studies range from a new community for 27,000 people to a housing project with 17 units. Although the focus of the guide is on planning approaches for new greenfields development, much of the information is applicable to redevelopment and renewal projects.

**Development of Community-based Social Marketing Approaches for Achieving Sustainability** (1997)
This project will develop community-based social marketing initiatives to change consumer behavior and encourage more sustainable lifestyles. It is being undertaken in cooperation with other social marketing projects across Canada. The results of the project will be disseminated for use by program planners and community organization across Canada.

**Visualizing Sustainability: Analyzing Preferences for Sustainable Community Design** (1996)
This project models sustainable community design attributes in visual media and makes them available as educational information in interactive formats for use on computers and through the Internet. Responses from a forum with a wide audience will be documented and evaluated in order to determine use preferences for different regional contexts, and to assess awareness of the scope and implications of sustainable community design.

**The Ecological City: Canada's Overview** (1996)
This overview highlights the importance of the sustainability of urban regions in achieving national and global objectives and is intended to act as a resource document in Canada and abroad. It consists of a description of the major characteristics inherent in the ideal of an ecological city and overview of the domestic factors which influence urban development in Canada, such as government finances, geography and demographics. Selected innovative development are highlighted. Data on municipal programs and policies across a number of areas such as energy efficiency and intensification has been included. It identifies some of the fundamental or root challenges to establishing ecological cities in Canada. Seven innovative policy tools are described in detail. It also contains a description of the existing institutional structure, with emphasis on the important influence of federal agencies whose activities are often overlooked. A list of contacts and resource documents is included.

**Testing Consumer Receptivity to Sustainable and More Affordable Suburb Design in Calgary** (1996)
In this study, a sample of "consumers" in Calgary, Alberta are asked to say what they think about the possibilities for environmental protection, resource conservation, and affordability and choice in housing, that can be offered when a residential community is designed explicitly to achieve sustainable development goals. The study: simulates a comprehensive design for sustainable communities; compares it with conventional suburban communities, in terms of costs and trade-offs, environmental-resource benefits, household opportunities and satisfaction; provides the consumer with a substantial repertory of images and information in a computerized hypermedia visualization format; and tests the receptivity of a small sample of householders to several features of sustainability.

**Sustainable Development and Canadian Cities Current Initiatives** (1994)
This report provides a brief background of the changes and the increasing support for a new approach to the planning and management of cities. It identifies community, equity, self-determination, integration, balance and diversity as essential principles of a sustainable urban development plan. It suggests that more coordination, cooperation and partnerships are needed between governments, businesses, NGOs

and communities in the management of cities. It also provides a comprehensive syntheses of local activities which address environmental concerns, including programmes and policies which address specific environmental issues. It also identifies opportunities which local organizations use to effect change.

**Assessment of Built Projects for Sustainable Communities** (1994)
This study establishes an extensive knowledge base on progress towards sustainable development being made in Scandinavian urban contexts, examining over 30 projects. Five of the projects were selected for detailed case studies. These are presented with planning-design data, graphic illustration and a description of each project. A set of over 50 sustainability applications are derived from this investigation. Public policy initiatives and the local community context for sustainability advances are discussed. The discussion addresses the orientations towards sustainability in municipal administration, and in industry orientations to consumers and marketing strategies. The study also examines the potential for transferability to the Canadian context. A concept scheme and a partnership proposal for building a demonstration project in Calgary are presented. The proposal draws on a nine-point set of performance goals. The implementation process involves houseseeker groups who interact continuously with builders and municipal agencies as user-participants in the design of the communities.

**Opportunities for Accelerating Implementation of Environmentally Sustainable High Performance Housing** (1994)
Five innovations from recent Canadian housing demonstration programs were selected for their potential to make significant contributions to sustainable, high-performance housing. Opportunities for accelerating implementation of these innovations were identified by determining ways to capitalize on opportunities, and ways to overcome obstacles for each innovation. The five innovations were: integrated ground source heat pump systems, integrated high-efficiency gas hot water heaters, super window, water purification systems and comprehensive landscaping. The effective distribution of simple, clear and authoritative literature on the economic benefits of implementing various home improvement options is recommended, as well as term financing from utilities and product suppliers and performance warranties.

**Sustainable Planning in Residential Land Use Planning** (1993)
This study of three Nova Scotian communities considers whether residential land use planning practice is changing in response to the idea of sustainable development. Through reviewing policies, regulations and practice in three communities, the analysis reveals that most of the participants in the land-development process agree with sustainable development in principle, but in practice continue to destroy landscape functioning and to consume natural resources. The authors recommend that the Nova Scotia government act to make the province's Sustainable Development Strategy a land use policy with the force of law. Other legislation should be amended to reflect a commitment to sustainability. Key indicators are proposed to measure progress.

**Sustainable Residential Development : Planning, Design and Construction Principles: Greening the Grow Home** (1993)
Using the Grow Home as a case study, this study investigates a broad range of issues related to the planning, design and construction of sustainable residential developments. Starting with the housing unit, the study includes design and detailing of the building envelope, water-efficient landscapes and plumbing fixtures, responsible domestic waste disposal and good indoor air quality. The effect of building systems, components and materials on the environmental throughout their life cycle is also examined. The discussion focuses on strategies for minimizing the environmental impacts, including conserving energy and other natural resources, and minimizing land, water and air pollution. The second part examines issues related to lot subdivision and site planning. Strategies for building housing communities are proposed which are resource-efficient and pleasant, comfortable,

functional living environments. Alternative approaches are illustrated through three examples of urban developments with varying densities, housing types and planning approaches.

## TRANSPORTATION

**The Impact of Urban Form on Private Vehicle Use and Travel Accessibility** (1999)
This study will determine how land use patterns affect travel behavior. The analysis will make use of detailed existing data on observed travel patterns from a travel survey of over 6,000 Edmonton households conducted by the City of Edmonton, including demographic data. The data will be used to analyze, at a disaggregated household level, the factors which correlate most strongly with private vehicle use.

**Tool for Evaluating Neighbourhood Sustainability: Greenhouse Gas Emissions from Urban Travel** (2000)
This study will compare the GHG emissions from personal urban transportation given variations in community planning and design characteristics such as density, land use mix and road patterns. The final product will be a quantitative tool to evaluate development proposals for GHG emissions from urban travel.

**The Information Revolution and Residential Development** (ongoing)
This report outlines the current status of telecommuniting and other aspects of the information revolution on urban form, for example, densities and shifts of development away from urban cores.

**Urban Travel and Sustainable Development: The Canadian Experience** (1993)
This paper was carried out to provide insight to the Organization for Economic Cooperation and Development (OECD) into major transportation-related environmental, economic and social problems currently being faced by Canadian cities. It provides an overview of the social, political and economic forces which have shaped Canadian urban transportation during this century, as well as successes and failures of urban transportation systems in resource-efficiency. Recent initiatives in Canadian cities as well as 25 potential initiatives are also presented.

## INDICATORS

**Developing Indicators of Urban Sustainability: A Focus on the Canadian Experience. with ICCUR and Environment Canada** (1996)
This study proposes a six-step process as a means of developing a set of urban sustainability indicators. Three detailed case studies are presented in order to illustrate how indicators are being developed in a variety of contexts.

**Measuring Urban Sustainability: Canadian Indicators Workshop Proceedings, June 1995 - with Environment Canada** (1995)
As part of Canada's preparation for Habitat II, CMHC and Environment Canada co-hosted this workshop. It brought together 75 urban indicator experts to discuss the successes and pitfalls of current frameworks and chart a course for future work. It concluded that the necessary next steps include: identifying national organizations to take the lead role in developing indicators; establishing an ongoing process for indicator development; developing a menu of common indicators and guidelines; preparing a resource and how-to guide for municipalities; and creating an information sharing network.

## ENERGY CONSERVATION - COMMUNITY

**Community Energy Systems** (planned)
In situations where community energy systems are being considered, it is important to understand how the marginal cost of reducing energy demand in the home compares with the cost of supplying energy from a community system. A general method of carrying out an analysis of the comparison will be developed in this project.

**Energy Performance Contracting and Residential Sector** (1996)
Energy Performance Contracting (EPC) allows private firms to enter into arrangements with property owners to reduce the energy

consumption of their buildings through customized energy- efficiency upgrades. Despite the success of EPC in non-residential markets, virtually no applications in the housing sector have been achieved in Canada. The objective of this study was to determine if the EPC industry could successfully enter the residential market. The study revealed the following key findings: a mature EPC industry currently exists in virtually every region of Canada; the EPC industry has successfully entered the US residential sector; there is a market for EPC in Canada's residential sector; and barriers to EPC entry into the residential market can be overcome.

**Community Energy System Project: Energy Evaluation of Seniors Housing Unit - Whitesands First Nation** (1996)
The objective of this study is to accurately determine the energy loads for a small cogeneration facility to serve a 10-unit seniors housing project at Whitesands First Nation near Armstrong, Ontario.

**Environmental Improvement through Urban Energy Management: Canadian Overview** (1995)
As part of the work of the OECD Project on urban energy management for environmental improvement, member countries prepared review papers describing the current approach and best practices with respect to urban energy management in their countries. The paper describes the rationale for urban energy management in a Canadian context and highlights the best Canadian practices to inform and suggest a future strategy for local governments in Canada. It contains background material on the supply and demand of fuels and electricity in Canada and the related environmental impacts, with particular reference to urban energy and environment issues, as well as the role of local government. The results of a survey of urban energy management for environmental improvement in Canada are described, with an emphasis on best practices and illustrations of innovative programs. It also discusses barriers encountered by municipalities and the common elements essential to success.

**Community Energy Systems** (1994)
This report examines a broad range of issues relating to the implementation of cogeneration in low-rise residential applications. A design concept is developed for the application of a reciprocating engine-based cogeneration system to a generic single dwelling unit, operating with a supplementary boiler in a thermal load following mode. A second concept is developed for a generic, multiple-unit, low-rise dwelling which incorporates district heating infrastructure. In addition, five sites are studied for the potential application of cogeneration.

**Consumer Housing Choices and the Environment** (1991)
Focus group sessions were held in Ottawa and Peterborough, Ontario to examine the ways in which consumer choices could affect the commercial development of environmentally improved housing. The consumers that participated were early adopters and the research centred on a) the pre-existing attitudes and knowledge of the participants, b) development of quantitative information about environmental housing options, and c) an analysis of how increased knowledge affected the housing choices of participants. Overall, they showed a clear preference for environmental features and these were seen to enhance housing quality.

## CONSTRUCTION WASTE

**Environmental Sustainability: Impediments to Construction Waste Reduction in Ontario** (1996)
This project was carried out in cooperation with the Ontario Home Builders Association. It gathers and analyzes information about successful and failed waste minimization practices, and identifies the potential financial costs and benefits at local levels. Based on the results, detailed information on how to develop waste reduction strategies applicable in the different geographical regions of Ontario will be made available to local Home Builders Associations.

**Housing De-construction** (1996)
The deconstruction of a house in Ottawa was carried out in order to reuse and recycle as close to 100% as possible of the building materials. This project shows that deconstruction can provide an environmental benefit and has a positive economic potential to divert construction and demolition waste. The long-term goal is to create an approved standard of deconstruction processes aimed at guiding contractors within the demolition industry towards more environmentally sustainable and economically viable work practices.

**Re-use: Integration of Used Building Materials into New Construction** (ongoing)
This research will document the existing salvage industry in Canada, and examples from the experience of architect, engineers and building of the re-use of materials in a number of recent project. It is intended to promote the practice of re-use of building materials in a number of recent projects. Four areas that are presently barriers to the viability of the practice will be studied: cost-efficiency and environmental impact; construction labour and practice; marketing used materials and products; and integrating used materials and products in new construction.

**Feasibility Study of Tools Designed Specifically for the Reused Building Materials Industry** (ongoing)
The sizable contribution made by construction and renovation activity to the waste streams of Canadian municipality is of increasing concern. The Used Building Materials Association (UBMA) has been formed in response to the increasing activity of recycles and re-store operators in the 'de-construction' of buildings and the resale of used building materials. This project, undertaken with the UBMA, will identify current volumes of material and methods of removal, the historic use of fasteners, the place for once-used materials in the house of the future and tools which would speed and improve salvage methods.

**Designing New Housing for Future Deconstruction** (ongoing)
This study investigates how houses can be designed and constructed today in a manner which will facilitate their de-construction tomorrow. It examines methods of housing construction which would ensure many of the materials reclaimed in the future would be undamaged and reusable, while still time and cost competitive with work practices on single family dwelling units in Ontario.

**Environmental Choices for Home Builder and Renovators -with CHBA, ONHWC** (1994)
This guide helps the home builder or renovator set environmental priorities and make effective choices. It explains how home builders and renovators are uniquely positioned to make an environmental difference and contains suggestions for marketing environmental benefits to the customers. The guide also includes a comprehensive products and technology section which identifies a wide range of products that can improve the environmental performance of housing. Contacts for obtaining additional information on suppliers are included through the guide, as well as a list of programs and publications on environmental housing issues.

**Residential Construction Waste Management Challenge Follow-up Survey and Report** (1994)
The purpose of this survey was to conduct a midterm follow-up on the impacts of a series of workshops, offered by CMHC. Participants who accepted the Challenge, thereby committing themselves to implement the 3R's in their operations were surveyed two years after attending. This report outlines the background of the challenge workshop, presents the questionnaire used in the survey, summarizes some highlights of the results, presents the statistical and anecdotal data, and makes recommendations for future.

## LANDSCAPES

**Comparison of Costs and Resource-efficiency for Seven Residential Landscape Options** (ongoing)
This study wil quantify and compare the annual horticultrual inputs oand costs of seven different residential landscape types including a wildflower meadow, naturalized woodland, xeriscape, and manicured lawn.

**Sustainable Landscape Design for Residential Developments** (ongoing)
This project highlights the link between sustainable development for housing with the condition, composition and use of native vegetation.

**Rooftop and Vertical Gardens: Identifying Barriers and Opportunities to Widespread Use** (1999)

**Renaturalization Program: Far North Village of Kuujjuaq** (1996)
Building on previous work to determine appropriate species and propagation methods, this research investigates and establishes natural regeneration processes for various specific site conditions and develops an implementation plan for all sties in the residential sectors in Kuujjuaq. The natural regeneration program was designed to serve as a model for other far north municipalities experiencing conditions that discourage natural regrowth of vegetation due to rapid development and severe weather conditions.

**Organic and Ecological Grounds Maintenance for Multiple Housing** (1995)
This report examines conventional grounds maintenance practices and reports on new methods of maintaining the grounds of housing developments. Emphasis is placed on sustainable, ecological maintenance instead of conventional "curb appeal". The reports lists and analyses current information on the various maintenance approaches and outlines the benefits of ecological maintenance, including: protection of the environment, improved human and plant health, reduction of waste, re-use of resources and costs savings.

## INFRASTRUCTURE

Alternative Methods of Financing Municipal Infrastructure (in publication)

Provision of Municipal Infrastructure through Demand Management: Guidebook and Case Studies (in publication)

Public-private Partnership in Municipal Infrastructure (in publication)

## CONTAMINATED LANDS

**Removing Barriers to the Redevelopment of Contaminated Sites for Housing** (1996)
The study provides suggestions and identifies research to assist in removing barriers to developing housing on contaminated sites. It examines 13 principles established by the Canadian Council of Ministers of the Environment to guide public policy on contaminated sites. This study recommends 22 best practices to address the issues including, risk assessment/risk management, adopting a user-pay approach to regulatory approvals, registering or certifying practitioners, and developing contaminated site profiles and registries.

**The Financial Services Sector and Brownfield Redevelopment** (1996)
This study identifies barriers which cause reluctance on the part of the financial services sector to finance brownfield development. An integrated approach between this sector, government, developers and the public is needed to remove barriers and ensure site clean-up. Recommendations for future strategies include: legislative reform to province a national framework for identifying liability, innovative tax incentives, education on environmental risk, new innovative insurance products and a broader use of risk transfer mechanisms by lenders.

**Environmental Assessment Guidelines for Residential Development in the City of Winnipeg** (1993)
This report provides an overview of current environmental legislation and regulations in Canada and the US and comments on the City of Winnipeg's jurisdictional responsibilities for environmental screening processes. In addition, six cities are surveyed to determine municipal involvement in environmental site assessments: Vancouver, Edmonton, Toronto, Hamilton, Montreal and Halifax.

**Environmental Site Assessor Educational Curriculum** (1994)
At the request of the Associated Environmental Site Assessors of Canada Inc., this set of two reports assists AESAC in developing a certification and training program for environmental site assessors.

**Field Tests of Remedial Measures for Houses Affected by Hazardous Lands** (1995)
This study evaluates the effectiveness of four remedial solutions installed on houses to prove soil gas infiltration resulting in the intrusion of radon, water vapour, methane and other volatile organic compounds. Nine houses were tested, all of which had the potential for methane intrusion.

**An Introduction to Environmental Site Assessments** (1994)
Environmental Site Assessments detect contamination and estimate the environmental risks associated with particular sites and allow informed decisions. This booklet introduces ESAs, discusses why they are useful, and describes how they should be carried out.

**Phase I Environmental Site Assessment Interpretation Guidelines** (1994)
This report assists property owners, lenders, mortgage insurers, environmental consultants and others in evaluating Phase 1 Environmental Site Assessment reports. It provides a simplified and consistent means for identifying whether or not the Phase I report contains all of the required components by current standards and if the conclusions presented are logically founded.

**The Relationship between Urban Soil Contamination and Housing in Canada** (1993)
This report outlines the economic, social and environmental impacts or urban soil contamination. It examines policy issues raised by urban soil contamination and reviews the measures adopted by both government and public agencies. The report suggests that most of the measures adopted by government agencies are designed to avoid taking on responsibility and liability. A consequence of the over-stringent approach to clean-up before permitting redevelopment is that if it simply does not take place, the risk remains and the public interest is not served. If standards were related to actual risk, there would be less interest in liability avoidance and more interest in managing the risk.

**The Compilation of Housing Data for Site Specific Risk Assessment Procedures** (ongoing)
The report compiles housing data to be used for site specific risk assessments and presents a draft of a handbook to be used by site assessors when selecting house characteristics.

## CONSTRUCTION

**Environmental Skills Register, Green Building Information Council (GBIC)** (ongoing)
The Environmental Skills register will identify individuals with skills in environmental design, analysis and management in the building sector. The GBIC will assemble and maintain the register. Other partners in this project are University of B.C., NRCan, Building Environmental Performance Information Criteria Foundation, Ontario Realty Corporation and CANMET.

# APPENDIX G - CHARRETTE PARTICIPANTS

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# ENDNOTES

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1 United Nations. (1987). *Our Common Future*. Oxford: Oxford University Press.

2 Sheltair Group Inc. (1998). *Visions, Tools and Targets: Environmentally Sustainable Development Guidelines for Southeast False Creek*. Vancouver: Sheltair Group Inc. (hereafter known as VTT).

3 Stanley Kwok Consultants Inc. (1997). *Creekside Landing on Southeast False Creek*. Vancouver: Stanley Kwok Consultants Inc. (hereafter referred to as CL).

4 City of Vancouver Planning Department. (1997). *Terms of Reference for Sustainable Development Consultancy*. Vancouver: City of Vancouver Planning Department, p. 2.

5 City of Vancouver Planning Department. (1998). *Urban Sustainable Development, Southeast False Creek* (hereafter referred to as USD).

6 City of Vancouver Planning Department. (1998). *Southeast False Creek Sustainable Neighbourhood: A Policy Statement to Guide Development* (Vancouver: City of Vancouver Planning Department, June 19 (henceforth referred to as PS).

7 PS, 20. These units will likely be subsidized rental units managed by a non-profit housing agency. Units will be leased from building owners on a 40-year lease.

8 City documents do not specify a square-metre guideline for the SEFC. This figure is adapted from Urban Development Institute standards.

9 Granville Island provides good working examples of small-scale manufacturing (e.g., kayaks) mixing with boat repair, hotels, community markets, glass blowers and, in what might be North America's most extreme example of truly mixed use, a concrete plant that regularly dispatches fully loaded concrete trucks through hordes of tourists.

10 The City has begun the process of licensing home-care day care centres.

11 *PS*, 34. The Creekside Landing proposal roughly conforms to this pattern, which can be seen in the photograph of the model shown on the first inside page of the *Creekside Landing Report*.

12 Ibid. Note: most water saving features will likely be located inside of structures and will likely not have a dramatic effect on SEFC urban design.

13 *USD*, 22 (this is twice the Vancouver average, but only half the amount grown by the typical resident of Village Homes in Davis, California).

# SEFC GLOSSARY OF TERMS

Berm: A man made linear vegetated earth mound designed to define areas and/or guide surface water flow, provide privacy and/or wind protection and/or improved solar access for plants.

Bio-Filtration: The use of living plant material to extract particulants from the wastewater stream.

Bio-remediation: An approach to the regeneration of polluted soils and waters based on natural biological processes and sequences.

Blackwater: Waste water from numerous sources, specifically containing human waste.

Brownfield site: A site which has polluted soils resulting from previous human uses.

Bruntlandt report: The report titled "Our Common Future" commissioned by the U.N. World Comission on Environment and Development to formulate a global agenda for change (1987) which was chaired by Gro Harlem Bruntlandt.

Building plate size: The area contained by the outline around the floor of a building.

Caisson: A concrete column placed into the ground either singly to transfer the weight of a building column through weak or wet soils to a layer of firm support or as one of many adjoined as a row to shore up the side of an excavation or control of the horizontal migration of water or gases through soil.

Co-generation: The simultaneous production of two products such as heat and electricity from one system. Co-generation often captures and reuses heat which might otherwise have been wastefully dissipated into the atmosphere.

Dead street syndrome: A street design which fails to generate a twenty four hour sense of occupancy (safety) and delight through the provision of casual meeting and safe walking opportunities, appropriate lighting and the introduction of a mix of uses which might cause round the clock use of the street (office, residences, retail, entertainment etc.)

Estuary: a water passage where tide water meets a creek current.

Face to face dimension: the distance between the fronts of buildings on opposite sides of a street or square etc.

Fine grain development: development predicated on smaller elements allowing frequent and varied pedestrian route choice opportunities and clear views to potential destinations.

Foreshore: the part of the seashore between high and low water marks.

Green waste: the products generated by landscape maintenance, gardening and preparation of vegetable food items (grass and branch clippings, dead plants, vegetable scraps etc.)

Greenway: a route designed to accommodate the movement of people and/or water and/or wildlife through a landscaped or natural environment.

Greywater: any water which has been used primarily in the home except water from toilets.

Gross FSR (Floor Space Ratio): the ratio of the total amount of square footage in all floors of a building(s) as related to the size of the site assigned to it (them).

Habitat value: the value a planning or landscaping scheme has in providing the proper habitat for birds, insects and mammals to coexist in the appropriate balance with one another.

Heavy metals: metals that have a known toxicity, usually used in reference to those found in soils or building materials (mercury, zinc etc).

High street: the street in a neighbourhood where the majority of shopping, working and entertainment activities take place.

Hydrocarbons: organic compounds containing carbon and hydrogen as commonly found in petroleum, natural gas, coal etc.

Infrastructure: the connecting aspects of a community which supply the basic needs for heat, light, waste treatment, transportation, communication etc. (roads, sewers, paths, waterways, hydro lines etc.)

Intertidal: relating to or part of the coastal zone above the low tide mark.

Net FSR (Floor Space Ratio): The ratio between the floor area contained in a building or complex and the area of its site when calculated after deducting certain "non-habitable" areas such as mechanical spaces, elevators, stairwells etc. from Gross FSR (see above).

Parcel size: the size of a piece of land assigned to a specific development (single house lot, city block etc.).

Pedestrian scale: the scale of building heights, details and designs, street designs, intersection spacing etc. which are interesting, unintimidating, safe and easy to use and easy to comprehend by a individual walking through a community.

Permeable paving: paving which permits water to readily penetrate it or pass through it (paving stones with large openings, gravel, wooden walkways with cracks, certain porous asphalts).

Public green: natural or landscaped areas in a community which are accessible and usable by all residents. This could include "blue green" such as waterways as well as traditional parks, landscaped paths, public gardens etc.

Recreational/ecological infrastructure: the network of opportunities for pleasure and exercise which are predicated on natural or naturalized structures or systems such as shorelines, pathways, parks, wooded areas, gardens etc.

Renewable energy: energy created from sources which do not deplete any resources and which is created in a manner which can be repeated indefinitely without environmental damage (electricity from wind machines and photo-voltaics or tidal and wave power, heat or coolth from the ground or water).

Rip rap: irregularly shaped rocks dumped along the edges of waterways to control erosion.

Setback: the distance from a building face to the edge of a street.

Stormwater: rainwater which pours from rooftops or rushes across hard surfaces or through ditches or sewers as a direct result of a rainstorm.

Stirling engine: a very efficient engine type which can use numerous sources of fuel including the sun to produce heat, hot water and electricity in one operation.

Sustainability: a concept which embodies the philosophy of living indefinitely within the earth's means. Although it is a difficult term to define succinctly perhaps the most often quoted definition from the Brundltand Report "meeting the needs of the present without compromising the ability of future generations to meet their needs" sums it up well.

Sustainable design: an approach to design which embraces the creed of sustainability and manifests if through such things as minimal resource usage for construction and operation, the support and encouragement of healthy economics and the creation and maintenance of equitable social structures and access to proper social support.

Swale: a shallow, linear, vegetated depression in the earth most commonly created to direct the flow of stormwater.

Tree bosk: a small wooded area.

Urban agriculture: the production of food within urban boundaries, often done by a combination of small farms, community and private gardens located on rooftops, building walls or otherwise unused land between buildings.

Waste management: the control of the amount of liquid and solid waste being created through stringent design, purchasing and operating practices and the methodologies by which the resulting wastes are diverted from or reintroduced into the ecosystems through recycling, reuse, biological treatments, entombment etc.

Working green or working open space: Landscaped areas or community infrastructure components which contribute more than aesthetic value by also processing wastewater, supplying food, cooling, creating habitat, remediating soils etc.